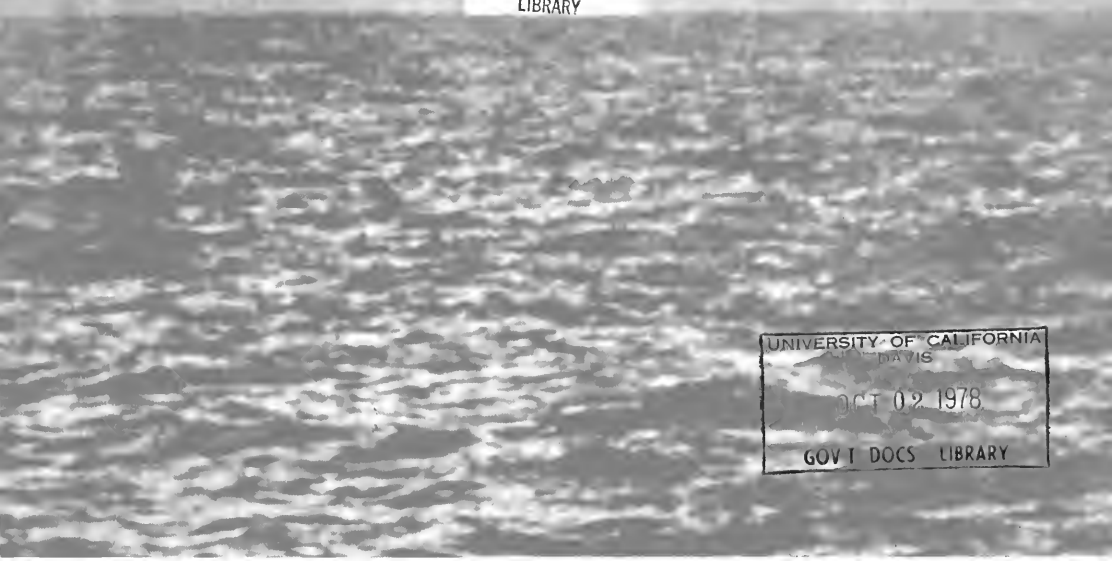


State of California
The Resources Agency

Department of
Water Resources

save water
DWR

California Sunshine — Solar Radiation Data

DRAFT

Bulletin 187
August 1978

Department of
Water Resources

Bulletin 187

California Sunshine — Solar Radiation Data

August 1978

Huey D. Johnson
Secretary for Resources

The Resources
Agency

Edmund G. Brown Jr.
Governor

State of
California

Ronald B. Robie
Director

Department of
Water Resources

Copies of this bulletin at $2.50 each may be ordered from:

State of California
DEPARTMENT OF WATER RESOURCES
P.O. Box 388
Sacramento, California 95802

Make checks payable to STATE OF CALIFORNIA
California residents add sales tax.

FOREWORD

Bulletin 187 has been prepared in response to a continuous need for data on sunshine intensity. The bulletin updates information presented in a 1974 Department of Water Resources report, "Solar Radiation Data."

The data on sunshine intensities presented in Bulletin 187 was derived from many different sources. In the past, such data were used principally for irrigation planning. Today, however, the needs of builders and those developing solar-energy systems have resulted in considerable additional solar-data research.

Bulletin 187 summarizes 900 "station years" of solar intensity data from 150 solar measurement stations and discusses the history of solar measurement in California. Its purpose is to provide summaries of readily available data on solar radiation in one convenient volume.

This is a companion volume to the recently issued Bulletin 185, "Wind in California," which summarizes available data on another form of solar energy -- wind. California's energy future will include increased reliance on the use of various forms of solar energy. The State Water Project, too, will some day power its pumps with solar energy. The Department of Water Resources, the principal environmental data gathering agency in California government, hopes that this bulletin will be useful to those investigating the effects of the energy of the sun.

Ronald B. Robie, Director
Department of Water Resources
The Resources Agency
State of California
Sun Day 1978

CONVERSION FACTORS

To Convert	To	Multiply by
Btu ft^{-2}	Langleys (ly)	2.713×10^{-1}
Btu ft^{-2}	$kWhm^{-2}$	3.160×10^{-3}
Btu ft^{-2} h^{-1}	Ly min^{-1}	4.522×10^{-3}
Btu ft^{-2} h^{-1}	Wm^{-2}	3.155
Btu ft^{-2} h^{-1}	Ly s^{-1}	7.537×10^{-5}
Btu	cal	2.520×10^{2}
Btu	Joule	1.055×10^{3}
Btu	kWh	2.931×10^{-4}
Btu h^{-1}	W	2.931×10^{-1}
Ly (langley)	Jm^{-2}	4.186×10^{4}
Ly min^{-1}	kWh m^{-2} min^{-1}	1.162×10^{-2}
Ly min^{-1}	erg cm^{-2} s^{-1}	6.974×10^{5}
Ly s^{-1}	Wm^{-2}	4.186×10^{4}
Wm^{-2}	$kWhm^{-2}$ s^{-1}	2.778×10^{-7}
kWh	M joules	3.600
kWh	Therms	3.413×10^{-2}
kWh	Btu	3.413×10^{3}
Wft^{-2}	WM^{2}	1.0763 x 10
Ton (Refrig.)	kW	3.51685
Ton (Refrig.)	Btu h^{-1}	1.2×10^{4}
Therm	kWh	2.931 x 10
Therm	Btu	1×10^{5}
Hp	W	7.46×10^{2}
Hp	Btu h^{-1}	2.545×10^{3}

To Derive	From	Divide by

Physical Properties of the Sun

Linear diameter	1,391,960 km (864,000 miles)
Angular diameter at mean earth-sun distance	32 minutes, 2.4 seconds
Mass	1.989×10^{33} grams
Volume	$1.4122 \times 10^{33} cm^3$
Mean earth-sun distance	1.496×10^{8} km (92,958,740 miles)

The Solar Constant

1.940 cal $cm^{-2} min^{-1}$

126 W ft^{-2}

428 Btu $ft^{-2} h^{-1}$

1353 W m^{-2}

4871 kjoules $m^{-2} hr^{-1}$

1.353×10^{6} ergs $cm^{-2} sec^{-1}$

CONTENTS

FIGURES

TABLES

CONTENTS (Continued)

State of California
EDMUND G. BROWN JR., Governor

The Resources Agency
HUEY D. JOHNSON, Secretary for Resources

DEPARTMENT OF WATER RESOURCES
RONALD B. ROBIE, Director

ROBIN R. REYNOLDS Deputy Director	GERALD H. MERAL Deputy Director	ROBERT W. JAMES Deputy Director

CHARLES R. SHOEMAKER
Assistant Director

DIVISION OF PLANNING

Donald E. Owen . . . . . Chief

ENVIRONMENTAL MEASUREMENT BRANCH

Kenneth L. Woodward . . . . . Chief

This report was prepared
under the direction of

Robert L. McDonell . . . . . Chief, Water Resources Evaluation Section

by

James D. Goodridge . . . . . Associate Engineer W. R.
Jerry L. Hatfield . . . . . Biometeorologist, University of California, Davis

with assistance from

Earl G. Bingham . . . . . Research Writer
Donald A. Schuder . . . . . Water Resources Technician II
Joseph Powers . . . . . Senior Meteorologist
Alex Maller . . . . . .Senior Electric Utility Engineer

ACKNOWLEDGMENT

This report is the summary of observations by many agencies including

Bay Area Air Pollution Control District
California State University at San Diego
Desert Research Institute, University of Nevada, Reno
Harza Agricultural Services, Fresno, California
Jet Propulsion Laboratory, Pasadena, California
Lawrence Berkeley Laboratory, Berkeley, California
Lawrence Livermore Laboratory, Livermore, California
Optical Coating Laboratories, Inc.
Pacific Gas and Electric Company
City of Santa Clara
Sandia Laboratories, Livermore, California
San Diego Gas and Electric Company
Southern California Edison Company
Superior Framing Company
University of California, Berkeley
University of California, Davis
U. S. Agricultural Research Service
U. S. Bureau of Reclamation
U. S. Army Corps of Engineers
U. S. Department of Agriculture
U. S. Forest Service
U. S. Geological Survey
National Weather Service
U. S. Navy

The Department of Water Resources is grateful for the reviews of David E. Johnson, Solar Data Consultant, Carmichael; Arndt Lorenzen of the Air Resources Board; Dr. Kinsell L. Coulson, University of California, Davis; and Dean Anson, Solar Consultant, Davis.

The cover photograph was taken by Thomas J. Rappolt, Staff Meteorologist, Science Applications, Incorporated, of La Jolla.

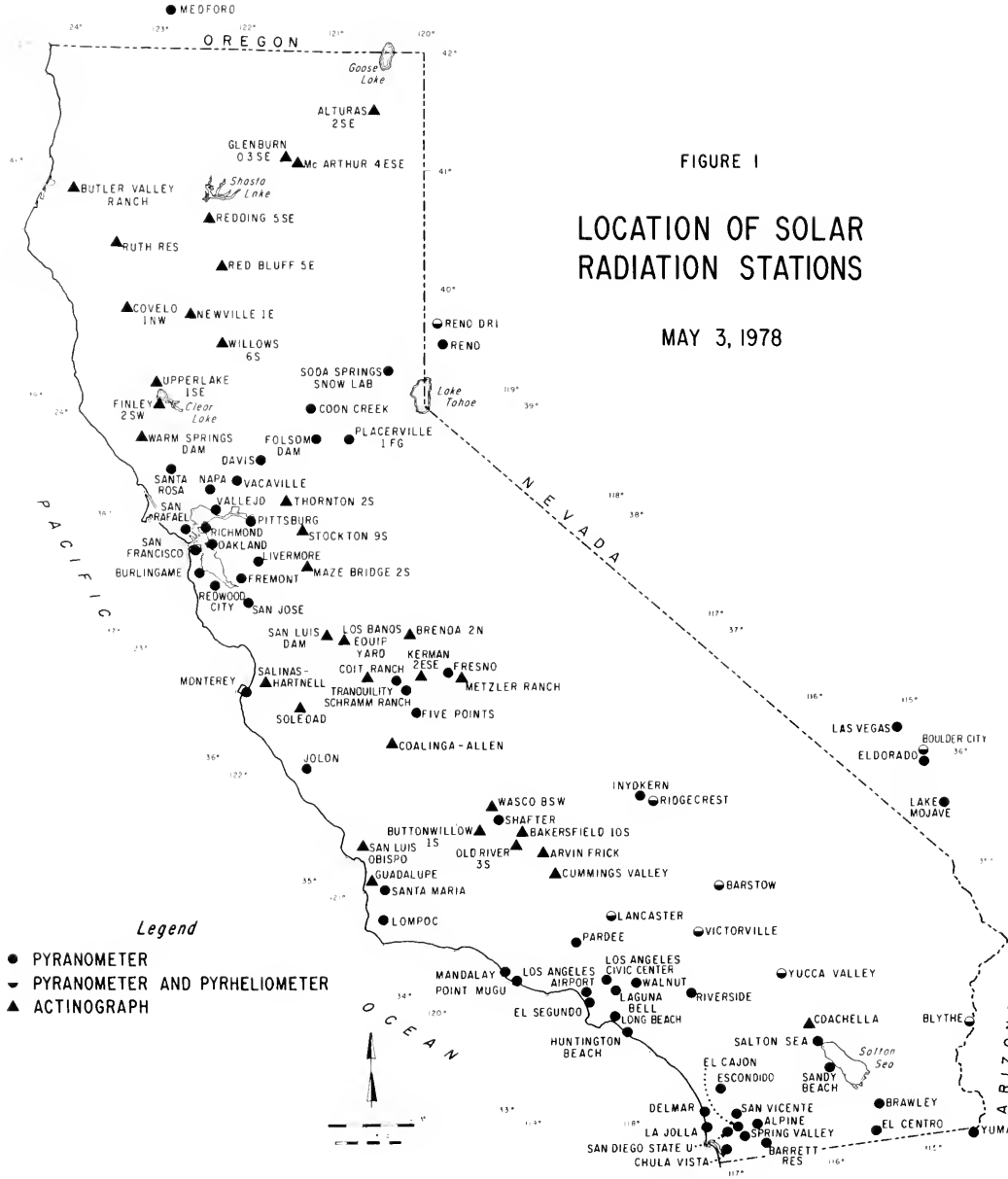


FIGURE 1

LOCATION OF SOLAR RADIATION STATIONS

MAY 3, 1978

INTRODUCTION

Solar radiation is the source of energy for all life on earth, and the sun is the source of power that drives the atmospheric processes. Variations in climatic conditions are frequently traceable to solar input to earth. Although scientists have been aware of its importance for several hundred years, solar radiation has been carefully measured only during this century.

Solar radiation data is applied to diverse operations such as crop irrigation and electric-power production. However, the direct use of solar energy for such processes is limited because the amounts reaching the earth's surface are diffuse and variable: Therefore, measuring the total amounts of, and the variations in, solar energy becomes very important.

The radiation emitted by the sun is unchanged as it passes through extraterrestrial space and arrives at the top of the atmosphere. However, during its transmission through the atmosphere it is depleted by absorption and scattering. Some of the radiation scattered out of the direct solar beam reaches the earth's surface as diffuse radiation from the sky. Therefore, the total solar radiation -- called global insolation -- received at the earth's surface at a specific location consists of two components: (1) direct and (2) diffuse radiation.[1/] In this bulletin direct and diffuse radiation measurements are reported in langleys

1/ A glossary of solar terminology is presented in Appendix A.

per day, where 1 langley (ly) is equal to 1 calorie per square centimeter (1 cal/cm^2), which is equivalent to 1,353 watts per square metre. The most extensive solar-radiation records for California are those of the National Weather Service, which are archived at the National Climatic Centre in Ashville, North Carolina.

To facilitate comparisons with surface-water, evaporation, and precipitation data, all of the data in this report are expressed in water years. The water year extends from October through September of the following year. For example, water year 1977 extends from October 1976 through September 1977.

Purpose

Bulletin 187 summarizes readily available solar data that will be useful for water planning and engineering. Solar radiation data are used for predictions of irrigation requirements of plants, the growth of which is directly related to the amount of solar energy they receive. Accumulated total solar energy is balanced against plant growth and evapotranspiration. The direct use of solar energy for domestic and industrial applications and for space heating -- to replace fossil fuels -- is developing rapidly.

Direct conversion of solar radiation into electric power is the objective of a large-scale plant under construction near Barstow, in the Mojave Desert, by an electrical power utility and the U. S. Department of Energy.

The decreasing availability of nonrenewable resources is one of the limitations that directly affect building design.

Decisions by architects and engineers on the use of energy in buildings affect 40 percent of the nation's energy budget. Today, solar space heating is highly significant, because it represents an important energy alternative and a thermally efficient match between a low-temperature energy source, i.e., a solar flat-plate collector, and a low-temperature application.

The average annual solar energy falling on America's roof tops is ten times the average annual energy used inside American homes. Accordingly, the universal abundance of solar energy calls for its use wherever it may be environmentally and economically feasible.

Scope

This bulletin presents solar-radiation data that will be useful in water resource planning and energy-related activities. It contains all readily available records from pyranometers, which measure radiation on a horizontal surface, and 8 sun-tracking pyrheliometers, which measure direct solar radiation by continuously tracking the sun.

The locations of solar radiation measurement stations are shown in Figure 1.[1/] The records for the solar measurement stations shown in Figure 1 are summarized in Table 1 (see page 28).

The data in Bulletin 187 indicate that:

- The most intense sunshine over California falls on the southeastern desert from Inyokern, in Kern

---

1/ Figure 1 appears on page x. For the reader's convenience, the remaining figures and tables follow the bulletin text (beginning on page 23).

3—77733

County, to Yuma, Arizona. In this area, an annual average of 70 percent of the sun's energy penetrates the atmosphere, compared with only 58 percent along the central and south coastal areas.

- The average calculated daily solar energy at the top of the atmosphere over California varies from 730 langleys per day at the latitude of San Diego to 655 langleys per day at the Oregon border.

- Tracking instruments have intercepted 33 percent more solar radiation than have horizontally exposed instruments.

- The measurement of solar radiation is complicated by the need for routine care and cleaning, as well as annual calibration, of instruments.

Related Data

Two publications, which are particularly useful to architects and others in the building industry, are Applications of Solar Energy for Heating and Cooling of Buildings[1]*, compiled by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, and the California Solar Data Manual[2] compiled by Paul Berdahl et. al. of the Lawrence Berkeley Laboratory. An extensive array of solar data is available at the World Data Center in Boulder, Colorado, which provides data services related to the sun and its effects on earth.

---

* A numbered list of references, together with a bibliography, follows the text, beginning on page 20.

TYPES OF SOLAR MEASUREMENTS

A primary objective of solar radiometry is to determine the instantaneous magnitude of the direct, diffuse, and total insolation falling on surfaces that may be tilted at any, angle to the horizontal. In the measurement of solar radiation, a small area of the incoming radiation must be intercepted by a surface that will absorb the radiant energy and convert it into heat. The heat is measured by various methods.[1]

Silicon photovoltaic cells may also be used, because their short-circuit current is a linear function of the radiant energy received by the cell. Black absorbing surfaces are generally insensitive to spectral variations in insolation intensity, whereas photovoltaic cells have nonuniform spectral sensitivity. Thermal expansion and evaporation of volatile fluids may also be used to produce effects that are proportional to the incoming radiation.[1]

The various types of solar-radiation measurements are discussed in detail by Coulson.[3] Carter shows 38 manufacturers of solar-radiation measuring instruments in his Listing of Solar Radiation Equipment and Glossary.[4] The records of solar-radiation measurements presented in this bulletin were obtained with three types of instruments:

1. Pyranometers, which have their collection surfaces exposed horizontally and measure direct and diffuse global insolation. Pyranometers are occasionally tilted at an angle equal to solar collectors to facilitate the gathering of collector performance data.

2. Pyranometers with shadow bands are also exposed horizontally and measure diffuse insolation by blocking the direct radiation with a band that shades the sensor from direct sunlight.

3. Pyrheliometers, which are exposed normal to the sun's rays and track the sun continuously, measuring direct solar insolation normal to the sun's beam.

These three basic instruments are illustrated in Figure 2.

The World Meteorological Organization has compiled a Guide to Meteorological Instruments[5], in which pyranometers are divided into three classes according to the accuracy of their measurements. Nine criteria on which these classifications are based, along with the required accuracy of measurement for each, are shown in Table 2.

The records reported in this bulletin were obtained with three basic types of pyranometers:

1. Thermopile, which are used by those who need first- or second-class insolation records. Thermopile pyranometers measure energy from a broad range of the spectrum.

2. Photovoltaic. Pyranometers activated by photo-electric effect (silicon "solar" cells). They have a spectrally selective sensitivity that leads to errors, because they tend to measure energy that is partly in the solar and partly in the near-infrared spectrum.

3. Actinographs. Mechanical bimetallic strip pyronographs, which operate on the principle of differential thermal expansion, tend

toward a temperature-dependent sensitivity that restricts their use to class-3 records. Their principal advantage is their low cost and the fact that they are entirely self-contained.

Routine calibration and maintenance of instruments are critical to the proper operation of a solar intensity measuring station. In some cases, however, instruments are installed and left to operate for extended periods without regular maintenance. Such neglect will impair the quality of the collected data, and the resulting errors may not be noticed for several years.

The records reported in Bulletin 187 were obtained from a wide variety of instruments and were compiled by a large number of operators with varying skills of observation, maintenance, and record reduction. Many of the pyranometer records show varying levels of solar radiation with time. The declines are attributed to a fairly uniform degradation of measuring-instrument sensors. For example, black paint on many older instruments had turned to greenish gray over a period of years. Because a black surface will absorb the highest solar radiation, the records derived from an instrument that has changed color will show less than the actual radiation falling on its surface. Some instruments also showed deterioration from changes in thermoconductivity between the black and white surfaces. Many of the records derived from instruments with deteriorated calibrations have been corrected by Berdahl.[2]

SOLAR RADIATION MEASUREMENTS IN CALIFORNIA

In California, solar radiation -- more specifically,

insolation -- is measured at 135 stations (Figure 1).[1/] Readily available records for the California stations are summarized in Table 1. Figure 1 shows only one station in the Sierra Nevada and three in the north coastal area, reflecting large voids in an ideal radiometry network. The station at Fresno is the oldest in the State. It has operated continuously since 1928.

Even with the extensive insolation records available, it is impossible to state with certainty whether radiation is increasing or decreasing, because of the inherent uncertainties in the calibration of pyranometers in a relatively short time scale. A decreasing trend shown by pyranometer records can frequently be attributed to deteriorating paint at thermopile junctions rather than to decreasing insolation. Although air pollution is suspected as a cause of increasing atmospheric turbidity and decreasing atmospheric transparency, this effect has not been verified for this bulletin.

Early solar insolation records covering six California stations were published by the National Weather Service. In the mid 1960s, many new stations were added to the statewide network for use in irrigation studies. Today, California utilities are installing new high-quality data-collection stations for solar-energy applications. Moreover, these modern records are available in even greater detail than those shown in this bulletin, e.g., by day, hour, and minute rather than daily averages by month.

1/ Including one station at Yuma, Arizona, one at Medford, Oregon, and five in Nevada near the California border.

Records of Solar Radiation

Records of average daily global solar radiation (by months) for 100 of the stations listed in Table 1 are presented in Table 3. The records are of varying quality; some are more complete than others. The data user must determine whether the records are of adequate quality for each specific application.

The type of pyranometer used at each station is shown in Table 1. The National Weather Service has selected the Eppley Laboratory's precision spectral pyranometer and the Spectrolab SR-75 as preferred instruments. Of course, even the finest instruments must be calibrated precisely, carefully maintained, and protected from dust, moisture, vibration, and shading. Natural "dust fall," for instance, can lower an instrument's indicated radiation level.

Direct Beam Solar Radiation

Measurements of direct-beam solar radiation are available from six stations with one year of record, and for two stations with three years of record. In the following tabulation, the direct-beam measurements are compared with records of global insolation from the same station. (All measurements are in langleys per day):

Station	Global, ly/d	Direct, ly/d	Ratio direct/global	Years of record
Barstow	484	629	1.30	1
Blythe	488	624	1.28	1
Boulder City	480	645	1.34	3
Lancaster	503	667	1.28	1
Reno DRI	454	594	1.31	3
Ridgecrest	498	687	1.38	1
Victorville	496	654	1.32	1
Yucca Valley	498	682	1.38	1
Mean	485	645	1.32	
Standard deviation	16	33	.04	

The data above show that mean direct-beam solar radiation was 33 percent greater than global solar radiation for this data set.

Shadow Band Solar Radiation

Shadow band pyranometers are intended to separate diffuse radiation, which comes from various parts of the sky, from direct radiation, which comes directly from the sun. Global solar radiation, as measured by a horizontally exposed pyranometer, consists of both direct solar radiation and diffuse sky radiation. The diffuse component contains (a) radiation that has been "scattered" from the direct solar beam on its initial downward traverse of the atmosphere, and (b) radiation that has been reflected from the surface and returned to a downward path by the overlying atmosphere.

Simultaneous measurements of two horizontally mounted pyranometers, one of which has a band to create a continuous shadow over the sensor, are used for measuring diffuse radiation. Coulson[3] discusses the corrections to diffuse sky radiation records, which compensate for the portion of the sky obstructed by shadow bands.

Two California stations, Oakdale and Fresno, have shadow band pyranometers.

Calibration of Pyranometers

No consistent program has previously existed for calibration of the pyranometers in California's solar-data network. Instruments are normally calibrated by the manufacturer before

being shipped but some have not been subsequently calibrated at regular intervals. The National Weather Service (NWS) "spot" checks calibration annually.

The effective use of "spot" calibration checks is complicated by the fact that valid comparisons between different pyranometers are difficult unless the instruments are of identical construction and history. The primary reason for this problem is that different instruments may deviate from the appropriate angular response, as well as other factors.

Instruments that are insensitive to tilt should be calibrated at direct normal incidence. Those that are sensitive to tilt should be calibrated with the sun high in the sky but not at normal incidence. The calibration of chart recorders, amplifiers, etc., must also be verified.

The need for periodic recalibration of pyranometers is shown by the adverse experience of NWS during the "spot" checks mentioned in the preceding paragraphs.[6] Systematic errors of 10 percent were not unusual, and the results of a number of "spot" calibration checks lead to the conclusion that a large number of pyranometers may be registering inaccurately.

Calibration changes are apparently caused mainly by the aging of the black paint used to absorb solar radiation. The aging is caused primarily by bleaching, although moisture penetrating the instrument may also be a factor.

Recently, NWS and the U. S. Department of Energy have undertaken a project to update much of the NWS data.[7] The calibration constants used to obtain the historical data were

sufficiently inaccurate that the pyranometers are now being recalibrated, i.e., with the calibration constants set so that the instrument agrees with the appropriate calculated values at solar noon on clear days. This procedure may obscure trends in the absorptivity of "clear" air, but it nevertheless improves the quality of the data. An adequate program of periodic calibration is essential if future data are to be considered reliable, and most agencies collecting solar data now have a program for this type of calibration.

The WEST Associates group of utilities (including Southern California Associates, San Diego Gas and Electric Company, and Los Angeles Department of Water and Power) has plans to recalibrate pyranometers every six months to ensure good-quality data. Southern California Edison Company will provide the calibrations, as well as a "loan" instrument to replace the field instrument while it is being calibrated.

In 1976, the National Oceanic and Atmospheric Administration established a solar-radiation calibration facility in Boulder, Colorado, under the direction of Edwin Flowers. The facility will maintain standards and will transfer calibrations to the solar instruments in the NWS network.

Other agencies have obtained pyranometers that serve as their informal standards. In some cases, these instruments are checked or calibrated, or both, through a side-by-side comparison with field instruments of the NWS network. The NWS network instruments in Davis and Fresno have been used for this purpose.

Correcting Historic Data

When it became apparent that drifting calibration of pyranometers had resulted in erroneous readings, the correction of historic global solar-radiation data was undertaken by Berdahl and associates at the Lawrence Berkeley Laboratories.[2] A typical pyranometer error results from the previously mentioned deterioration of black paint at thermopile junctions. Typical recorder errors were improper settings and occasional drifting of calibration.

Berdahl et. al. corrected many historic pyranometer data by use of a clear-day analysis, in which highest daily radiation values are compared with daily extraterrestrial radiation (ETR) values. At a typical station such as Fresno, Berdahl observed that the highest (clear-day) values were as high as 80 percent of ETR in the summertime and as high as 70 percent of ETR during the winter. The clear-day analysis made it possible to determine the relative readings when the atmosphere was most transparent and to adjust the records for deteriorating calibration. Daily values of the percentage of ETR were plotted, in which abrupt changes were noted when a new pyranometer with a different calibration was installed.

The clear-day analysis is basically a plot of the ratio of total global radiation divided by the daily ETR plotted against time. The analyses and adjustments to raw data require two assumptions: that (1) clear-day atmospheric conditions do not vary excessively from year to year, and (2) no long-term drift in solar radiation, due to air pollution, solar-constant variation, or other causes, has occurred.

In Bulletin 187, corrected records for certain stations are shown in Table 3, with the word CORRECTED following the station name. All other records are uncorrected. The corrections determined at Lawrence Berkeley Laboratories varied from a 15 percent decrease to a 15 percent increase in observed values.

Extraterrestrial Radiation

Extraterrestrial radiation (ETR) is that part of the solar energy flux that would be received on a horizontal surface without the influence of the earth's atmosphere. Average monthly ETR at different latitudes around the world is shown in Figure 3.

In California, average annual ETR varies from an annual average of 655 langleys per day at 42° north, near the Oregon border, to 730 langleys per day at 33° north near San Diego. Average monthly ETR for California is presented in Table 4. Average annual total solar radiation as a function of latitude is shown in Figure 4.

SOLAR CONSTANT

The solar constant is the mean quantity of solar radiation of all wavelengths received, per unit area and time, falling on the earth at the outer limit of the atmosphere, corrected to the mean distance between the sun and the earth. It is expressed as the equivalent of a surface normal to the incident radiation at the earth's mean distance from the sun. Variations in the solar constant are of great interest to scientists seeking a rationale for variations in climate. The problem is that the apparent range in solar output is masked in the error zone of solar-constant

measurements. Drummond[8] reports that errors in measurements of the solar constant are approximately 1 percent; the actual range of variation in the solar constant is only about 0.2 percent.[9]

The variation in global solar radiation on the earth's surface is due to weather conditions and the natural absorption and reflection of the atmosphere.

This report uses NASA's adopted design value of the solar constant of 1.94 langleys per minuts[3,8]; the probable variation in accuracy of that value is plus or minus 1 percent. A more recent (1977) estimate of the solar constant by Frolich is 1.97 langleys, however.[9] As energy radiates from the sun, the flux of energy per unit area of receiving surface inversely proportional to the square of the distance between earth and sun, which varies from a maximum on July 5 to a minimum on January 3. Accordingly, the solar constant varies from a high of 2.00 langleys in January to a minimum of 1.88 langleys in July, as shown in the following table:

Date	Solar Constant(ly/min)	Date	Solar Constant(ly/min)
Jan 1	2.00	July 1	1.88
Feb 1	1.99	Aug 1	1.88
Mar 1	1.97	Sept 1	1.91
Apr 1	1.94	Oct 1	1.94
May 1	1.91	Nov 1	1.97
June 1	1.88	Dec 1	2.00

The annual variation in the solar constant (H) is equal to: $H = 1.94 + 0.0645 \cos 0.986 N$, where N = the day of the year, starting with 1 = January 1.[10]

SOLAR TERRESTRIAL PHYSICS

Numerous solar effects on the environment -- beyond the obvious considerations of heat and light -- directly influence activities on earth. A few examples are the effects of the sun on shortwave radio communications, radiation hazards to humans in outer space, and effects on electrical-power transmission, geomagnetic prospecting, gas pipeline monitoring, and, possibly, the weather.

Dr. Herbert Kroehl of the National Geophysical and Solar-Terrestrial Data Center at Boulder Colorado has reported (by letter) that he feels "...the most promising in terms of explaining STP-M phenomena are:

1. The destruction of ozone by high-energy solar protons.
2. The frequency of thunderstorm and lightning occurrence correlation with the sunspot cycle.
3. The decrease in the vorticity area index following passage of a magnetic sector boundary within the solar wind.
4. The correlation between drought in the Midwest and the double sunspot cycle.
5. The solar rotation period (27 days) of atmospheric pressure.
6. The occurrence of ice ages during extreme minima of solar activity..."

Sunspot Data Since 1750

Sunspots have been systematically reported since 1750 by the Zurich Observatory in Switzerland. Many scientists have

looked for correlations between precipitation records at individual rain gages and the sunspot cycle, but so far with little success. Marshal[11] has reported positive correlations between sunspots and the variation in statewide average total annual precipitation in the great plains region of the United States. Dr. William C. Livingston of the Kitt Peak National Observatory, Tuscon, Arizona, has reported that sun temperatures are related to sunspot numbers, and that he measured an 11-degree drop in the surface temperature of the sun last year.[12]

Mean Zurich sunspot numbers from 1749 through 1977 (adjusted for the October-September water year) are plotted in Figure 5 and listed by month and year in Table 5.

Sunshine Duration

Measurement of sunshine duration is one of the oldest methods for estimating the quantity of solar radiation. The process consists of measuring the time during which the sun's disk is either unobscured by clouds or obscured to the point where no shadow is apparent. Historically, the two primary uses for sunshine-duration data were to (1) characterize regional data, and (2) estimate the total solar radiation flux for stations without pyranometers.

Today, however, pyranometers (which measure sunshine intensity as well as sunshine duration) are far more widely used in California than are sunshine recorders. Coulson[3] discusses various types of instruments used to record sunshine duration; he concludes that a rough approximation of the threshold value of radiation required to activate most sunshine-duration recorders

is about 0.12 calories per square centimeter per minute, with variations of a factor of two from this value.

Table 6 summarizes the average percentage of possible sunshine for certain stations in California, Arizona, and Nevada. On an annual basis, this varies from a high of 91 percent at Yuma, Arizona to a low to 50 percent at Eureka. The table shows that during June, Yuma receives 97 percent of possible sunshine whereas in December, Eureka receives only 40 percent. Table 7 shows the hours and minutes of maximum possible sunshine at various California latitudes.

As would be expected, clouds (sky cover) reduce the total sunshine duration at a given station. The mean monthly sky cover from sunrise to sunset at 23 NWS stations is shown in Table 8. At U. S. military weather stations, sky cover data are recorded on a 24-hour basis. Data from a number of military weather stations in California are presented in Table 9.

Sunrise-Sunset Tables

The data on sunrise and sunset presented in Table 10 were supplied by the U. S. Naval Observatory. These data may be used for any year in the 20th century. Within the geographical boundaries of the named city or area, errors in the tabulated data do not exceed two minutes and are generally less than one minute. In the vicinity of the named city or area, an additional error of 1 minute for each 9 miles outside the geographical boundary should be considered.

Sunrise or sunset is said to occur when the upper edge of the sun's disk appears to be exactly on the horizon. The

times shown in Table 10 are for an unobstructed horizon, under normal atmospheric conditions, at zero elevation above the surface of the earth in a level region. The computations are based on a constant diameter of the sun, mean atmospheric refraction, and the path of the sun during 1966.

Should greater precision be required, corrections for elevation of the horizon, durations from standard atmospheric conditions, and for a specific year, may be computed with the aid of data available in Tables of Sunrise, Sunset and Twilight. This book is available for $3.00 from the U. S. Naval Observatory, Washington, D. C., 20390.

5—77733

REFERENCES AND BIBLIOGRAPHY

A. References. The following references are those cited by number in the text:

1. John Yellott, "Solar Radiation Measurement." (in) Applications of Solar Energy for Heating and Cooling of Buildings (ASHRAE GRP170), edited by Richard C. Jordan and Benjamin Y. H. Liu. American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York, 1977.

2. Paul Berdahl, Donald Grether, Marlo Martin, and Michael Wahlig, Solar Data Manual; Lawrence Berkeley Lawrence Berkeley Laboratory, Solar Energy Group, Energy and Environment Division, University of California, Berkeley, CA 94720. January 1978.

3. Kinsell L. Coulson, Solar and Terrestrial Radiation, New York: Academic Press, 1975.

4. E. A. Carter, S. A. Greenbaum, and A. M. Petel, Listing of Solar Radiation Equipment and Glossary. University of Alabama, Center for Environmental and Energy Studies, P. O. Box 1247, Huntsville, AL, 35804. July 1976.

5. Guide to Meteorological Instrumentation and Observing Practices, 4th ed., 1971. WMO No. 8T P. 3, Secretariat, World Meteorological Organization, Geneva, Swizerland.

6. E. C. Flowers, "The So-Called Parson's Black Problem with Old-Style Eppley Pyranometers," Report and Recommendations of the Solar Energy Data Workshop, November 29-30, 1973. Report NSF-RA-N-74-062. Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

7. Frederick A. Koomanoff, "Monitoring the Solar Resource," Proceedings of the ISES Winnipeg Conference, 1976. International Solar Energy Society, National Science Center, P. O. Box 52, Parkville, Victoria 3052, Australia.

8. A. J. Drummond, "Recent Measurements of the Solar Radiation Incident on the Atmosphere." Space Research XI, Akademie - Verlag, Berlin, Germany, 1971.

9. C. Frolich, "Contemporary Measures of the Solar Constant," (in) The Solar Output and Its Variation. Edited by Oran R. White. Boulder, Colorado: Colorado Associated University Press, 1977.

10. Paul Berdahl and others, Analysis of the California Solar Resource. Draft final report covering April 1976 through 1977. Lawrence Berkeley Laboratory, Energy and Environment Division, Berkeley, CA 94720.

11. James R. Marshal, Precipitation Patterns of the United States and Sunspots, Doctor's thesis, Washington State College, Pullman, WA, 1973.

12. "Sun Gets Colder," Sacramento Bee, February 16, 1978.

B. General Bibliography

Carter, E. A., Wells, R. E., and Williams, B. B., Solar Radiation Observation Stations. A complete listing of data archived by the National Climatic Center, Asheville, NC, and an initial listing of data not currently archived. University of Alabama, Johnson Environmental and Energy Center, P. O. Box 1247, Huntsville, AL 35807. November 1976.

Chapman, Robert D., Solar Terrestrial Programs--A Five-Year Plan. National Aeronautics and Space Administration, Solar Terrestrial Programs Office, Office of Space Science, Goddard Space Flight Center, Greenbelt, MD 20771. January 1977.

Durrenberger, Robert W., Solar Radiation and Sunshine Data for the Southwestern United States, 1966-1974. Arizona State University, Laboratory of Climatology, Tempe, AZ 85281. February 1976.

Eddy, John A., "The Case of the Missing Sunspots," Scientific American, May 1971.

Giorgis, Robert B., Jr., A Simple Solar Radiation Model for Computing Direct and Diffuse Spectral Fluxes. Master's thesis, University of California, Davis, CA 95616. 1977.

Griffeths, John F. and others, "The Mean Distribution and Variation of Solar Radiation and Sunshine in Texas," Part 3, Agroclimatic Atlas of Texas. Texas Agricultural Experiment Station, College Station, Texas.

Kusuda, T., and Ishii, K., Hourly Solar Radiation Data for Vertical and Horizontal Surfaces on Average Days in the United States and Canada. NBS Building Science Series 96, April 1977. Published by Program Planning and Liaison Unit, Center for Building Technology, Institute for Applied Technology, National Bureau of Standards, Washington, D. C., 20234.

Patapoff, Nick W., Solar Energy Measurements During 1976. The West Associates Solar Resource Evaluation Project, published by Southern California Edison Co., P. O. Box 800, Rosemead, CA 91770. June 1977.

Proceedings of the Second National Solar Radiation Data Workshop, November 1977. Prepared by Kenneth E. Johnson Environmental and Energy Center, University of Alabama, P. O. Box 1247, Huntsville, AL 35807.

San Diego Gas and Electric Co. (Robin Taylor), 1976 Solar Radiation Data for San Diego County. Published by San Diego Gas and Electric Co., Gas Division--Solar Section, P. O. Box 1831, San Diego, CA 92112. April 1977.

Smithsonian Meteorological Tables, Sixth Revised Edition. Smithsonian Institution, Washington, D. C., 1951.

Solar-Terrestrial Physics Services and Publications, November 1975. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Geophysical and Solar-Terrestrial Data Center, Environmental Data Service, Boulder, CO 80302.

Taylor, S. E., Sunlight, Sunshine, Shedding Some Light on the Subject. Western Region Technical Attachment No. 78-3, National Weather Service, Salt Lake City, UT. January 1, 1978.

U. S. Department of Commerce, Hourly Solar Radiation-Surface Meteorological Observations. National Oceanic and Atmospheric Administration, Environmental Data Service, National Climatic Center, Asheville, North Carolina. December 1977.

World Data Center "A" for Solar-Terrestrial Physics: Solar-Terrestrial Physics and Meteorology, A Working Document, July 1975; and Working Document II, August 1977. Special Committee for Solar-Terrestrial Physics, National Academy of Sciences, Washington, D. C., 20418.

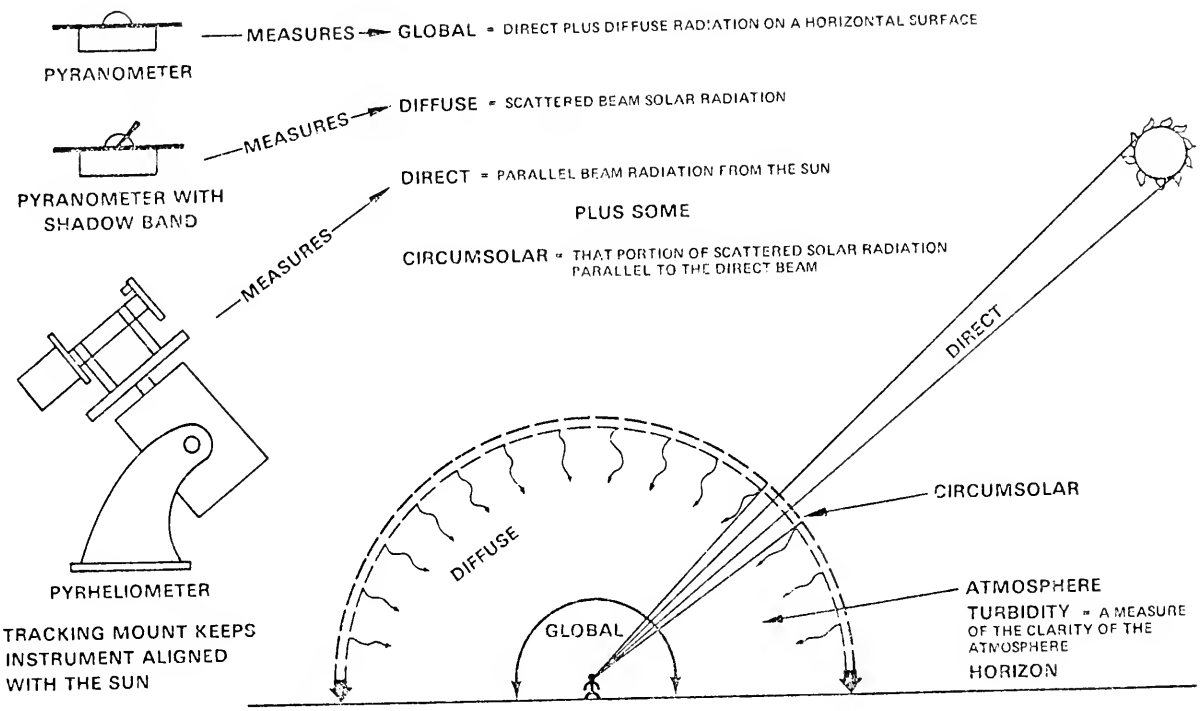
World Trade Center: Proceedings of a Forum on Solar Access, conducted by the New York State Legislative Commission on Energy Systems, July 28, 1977, World Trade Center, New York, NY.

Yinger, Robert J., Solar Energy Measurements at Selected Sites Throughout the Southwest During 1977. The West Associates Solar Resource Evaluation Project, published by Southern California Edison Co., P. O. Box 800, Rosemead, CA 91770. June 1978.

FIGURES 2 THROUGH 5

TABLES 1 THROUGH 10

TYPES OF INSOLATION AND MEASURING INSTRUMENTS



Source: Summary Report, "Solar Energy Environmental and Resources Assessment Program" (ERDA)

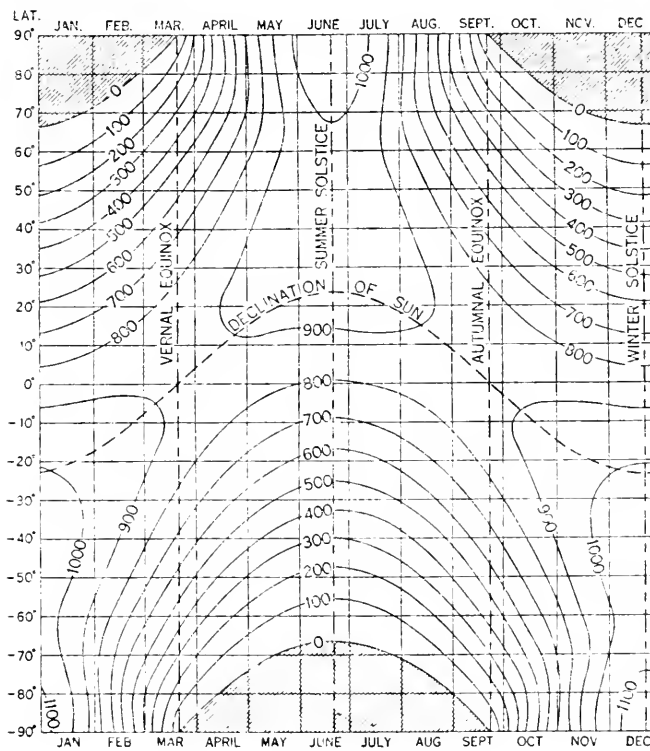
FIGURE 2

FIGURE 3

CHART OF THE TOTAL DAILY SOLAR RADIATION AT THE TOP OF THE ATMOSPHERE

The solar constant I_0 is assumed to be 1.94 cal. cm.$^{-2}$ min.$^{-1}$

The solid curves represent total daily solar radiation on a horizontal surface at the top of the atmosphere, measured in cal. cm.$^{-2}$ Shaded areas represent regions of continuous darkness



Source: Smithsonian Meteorological tables, 6th ed. rev., Smithsonian Institution, 1951.

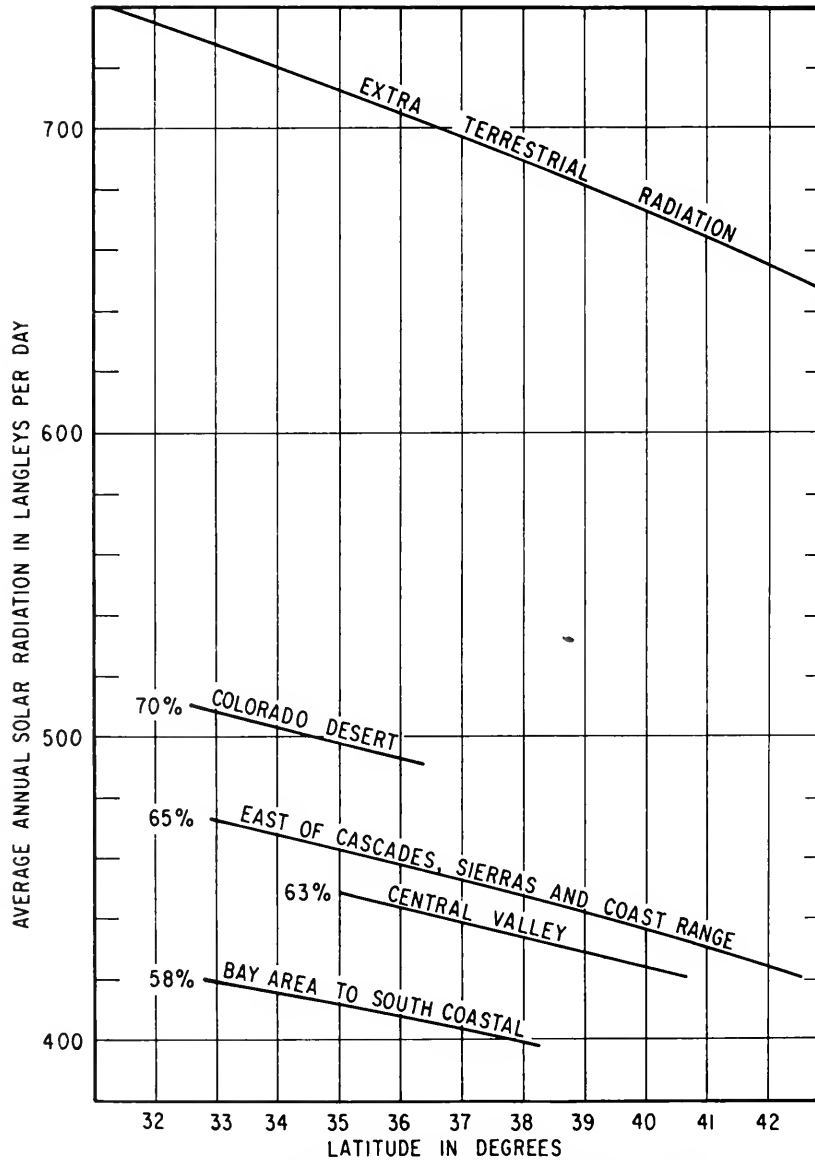


Figure 4. AVERAGE ANNUAL SOLAR RADIATION IN LANGLEYS PER DAY

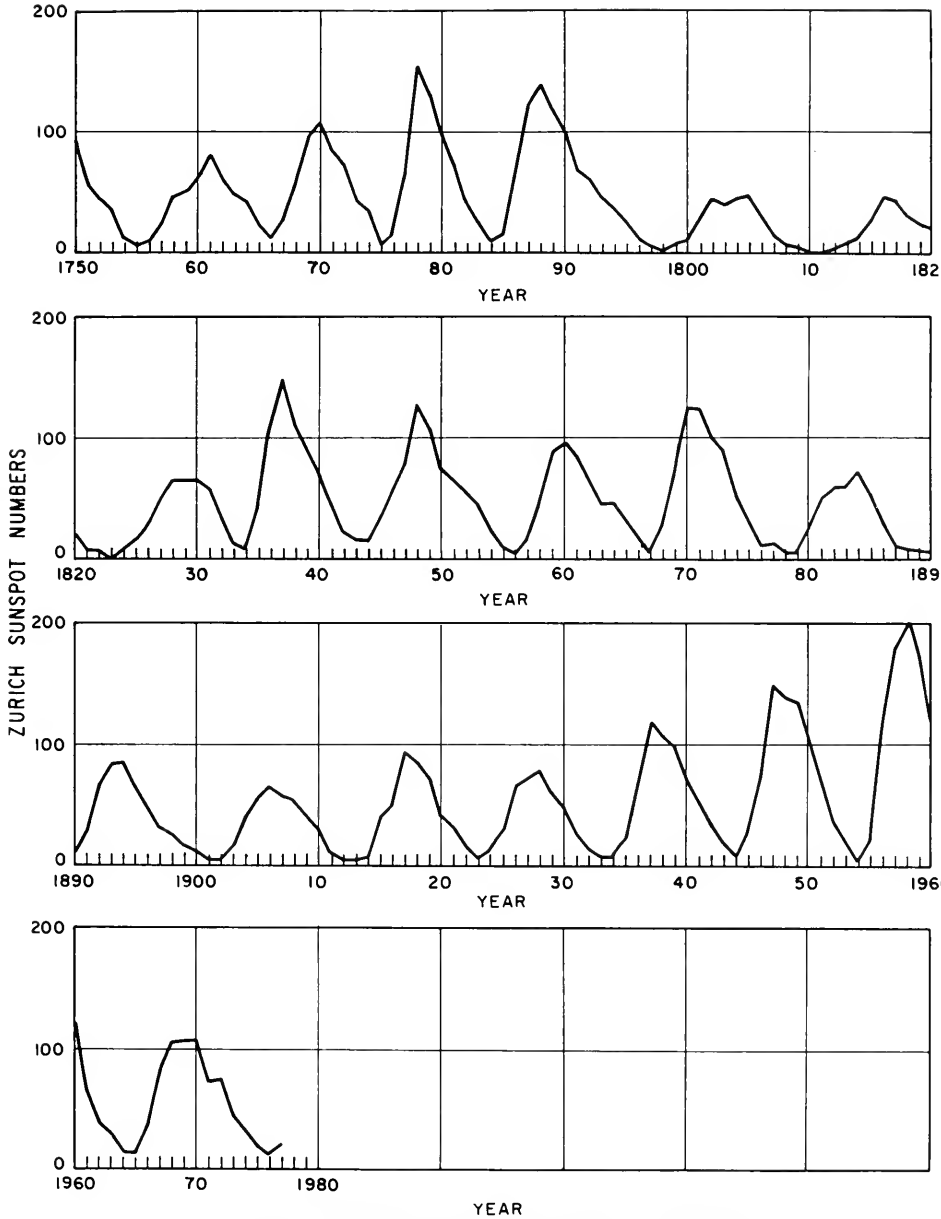


Figure 5. MEAN ZURICH SUNSPOT NUMBERS
ADJUSTED TO OCT.—SEPT. WATER YEAR

6—77733

TABLE 1. SOLAR RADIATION STATIONS IN CALIFORNIA AND ADJACENT STATES
(See explanation of column headings at end of table)

Station	Latitude	Longitude	Elev	RB	RE	SU	AVG	ETR	%E	TP
ALHAMBRA	34 05 10	118 08 30	470			SEC				48
ALPINE	32 51	116 47		1975		SDG	435	721	60	48
ALTURAS 2SE	41 27 58	120 30 59	4360	1958	1964	DWR		660		A
ARVIN FRICK	35 13 58	118 52 08	437	1959	1965	DWR		711		A
BAKERSFIELD 10S	35 14 20	118 59 20	328	1969	1970	DWR		711		A
BARRETT RESERVOIR	32 36 52	116 42 20	875	1960	1961	GS	468	730	64	10
BARSTOW	34 53 20	117 00 20	2180	1976		SEC	484	713	68	48
BLYTHE	33 36 10	114 36 05	264	1976		SEC	488	723	67	48
BOULDER CITY NEV	35 59	114 51	2500	1974		DRI	480	705	68	T
BRAWLEY	32 57 15	115 33 30	140	1967	1969	ARS	486	728	67	T
BRENDA 2N	37 04 11	120 08 24	270	1962	1963	DWR		697		A
BURLINGAME	37 35	122 21	25	1973	1976	BAP	419	692	61	48
BUTLER VALLEY RANCH	40 46	123 54	420	1970	1975	CE	305	666	46	A
BUTTONWILLOW 1S	35 23 27	119 27 42	270	1965	1966	DWR		710		A
CHINA LAKE	35 39	117 40	2700	1976		L8L				2
CHULA VISTA	32 40	117 02		1975		SDG	400	730	55	48
COACHELLA	33 40 28	116 09 33	83	1967	1973	BR		723		A
COALINGA-ALLEN	36 10 36	120 14 12	560	1975		HAR		703		S
COIT RANCH	36 42 20	120 28 25	278	1974		HAR	436	700	62	S
COON CREEK	38 58 48	121 08 09	500	1961	1966	UCD		681		T
COTTONWOOD	33 48	117 00	1500	1973	1974	GS				2
COVELO INW	39 47 53	123 15 23	1390	1966	1969	DWR	432	675	64	A
CUMMINGS VALLEY	35 06 34	118 34 05	3920	1965	1972	DWR	473	712	66	A
DAVIS	38 32 06	121 46 30	60	1942		NWS	431	686	63	50
DEL MAR	32 57	117 16		1975		SDG	431	730	59	48
EL CAJON	32 47	116 58		1975		SDG	458	729	63	48
EL CENTRO	32 48 47	115 39 40	-100	1963		NWS	512	729	70	T
EL DORADO NEVADA	35 47 50	115 00 20	1795	1975		SEC	469	713	66	48
EL SEGUNDO	33 54 30	118 25 25	40	1976		SEC	429	721	60	48
EL TORO	33 38 00	117 42 30	360			SEC				48
ESCONDIDO	33 08	117 06		1975		SDG	401	727	55	48
FINLEY 2SW	38 59 14	122 53 39	1360	1972	1973	DWR		681		A
FIVE POINTS	36 22 20	120 06 12	263	1972		BR	443	702	63	WM
FOLSOM DAM	38 42 25	121 09 40	350	1974		BR		683		S
FREMONT				1970		BAP	415	692	60	48
FRESNO	36 46 10	119 43 02	328	1928		NWS	439	699	63	2
FRESNO	36 49 18	119 44 27	340	1972		CSU				48
GERBER 1SW	40 02 42	122 09 55	230	1973		DWR		673		A
GLENBURN 0.3SE	41 03 45	121 29 15	3314	1963	1966	DWR		664		A
GOLDSTONE	35 18	116 48	3220	1974		JPL				75
GUADALUPE	35 00	120 32	100	1961	1964	DWR		713		A
HIGH POINT	35 56	121 09	1850	1972		USA		705		T
HUNTINGTON BEACH	33 38 35	117 58 45	20	1976		SEC	431	723	60	48
INYOKERN-CHINA LAKE	35 41	117 37	2160	1948		NWS	492	708	69	48
JOLON	35 57	121 14	900	1971		USA	478	705	68	G
KERMAN 2ESE	36 42 58	120 01 26	225	1964	1964	DWR		700		A
LAGUNA BELL	33 58 30	118 08 45	136	1976		SEC	423	720	59	48
LA JOLLA	32 50	117 15	85	1928	1950	UC	407	729	56	T
LAKE MOJAVE	35 12	114 34	657	1959	1961	GS	519	711	73	10
LAKE MEAD	35 59	114 51	2525	1952	1953	GS	505	705	72	10
LANCASTER	34 42 05	118 08 40	2343	1976		SEC	503	715	70	48
LAS VEGAS NEV	36 05	115 10	2162	1960		NWS	477	704	68	2
LIVERMORE	37 40	121 50	500	1974		LLL				48
LIVERMORE	37 40	121 50	500	1974		SOA				75
LIVERMORE	37 40	121 50	500	1971	1973	BAP	450	692	65	50
LOMPOC	34 35 53	120 27 08	500	1950	1952	ARS		716		T
LONGBEACH	33 46	118 11	35	1971		CSU		722		K
LOS ANGELES AIRPORT	33 56 32	118 23 12	105	1951		NWS	446	721	62	50
LOS ANGELES CIVIC C	34 03 19	118 14 26	548	1951	1974	NWS	437	720	61	T
LOS BANOS EQUIP YD	37 00 57	120 53 56	180	1959	1962	DWR	446	697	64	A
MANDALAY	34 12 25	119 14 60	20	1976		SEC	406	719	56	48
MAZE BRIDGE 2S	37 36 57	121 12 40	35	1962	1965	DWR		700		A
MC ARTHUR 4ESE	41 01	121 21	3350	1958	1958	DWR		664		A
MEDFORD ORE	42 22	122 52	1296	1950	1975	NWS	368	653	56	T
METZLER RANCH	36 40 53	119 37 40	340	1976		HAR		700		S
MONTEREY NPGS	36 36	121 52		1971		USN				50

TABLE 1. SOLAR RADIATION STATIONS IN CALIFORNIA AND ADJACENT STATES (Contd)
(See explanation of column headings at end of table)

Station	Latitude	Longitude	Elev	RB	RE	SU	AVG	ETR	%E	TP
MOORPARK	34 16 50	118 54 15	461			SEC				48
NAPA	38 17	122 17	15	1972	1974	BAP	367	687	53	50
NEWVILLE 1E	39 47 37	122 30 45	650	1966	1970	DWR	436	675	65	A
NORTHRIDGE	34 14 17	118 31 48	857	1963		CSU				M
OAKLAND	37 47	122 10	100	1970	1971	BAP	392	691	57	T
OLD RIVER 3S	35 13 16	119 06 20	334	1965	1967	DWR		711		A
PACIFIC GROVE	36 38	121 56				HM				A
PALM SPRINGS	33 47 15	116 27 45	305			SEC				48
PARDEE	34 26 30	118 34 55	1035	1976		SEC	458	717	64	48
PITTSBURG	38 02	121 51	100	1970	1974	BAP	425	689	62	50
PLACERVILLE IFG	38 44 24	120 44 28	2755	1976		BR		683		S
POINT MUGU	34 07 06	119 06 24		1966		USN	411	719	57	48
RED BLUFF 5E	40 10 12	122 08 20	278	1967	1969	DWR	422	671	63	A
REDDING 5SE	40 32 36	122 18 08	500	1958	1968	DWR		668		A
REDWOOD CITY	37 29	122 14	100	1964		BAP	438	693	63	50
RENO DRI	39 40	119 40	5056	1974		DRI	454	677	67	T
RENO NEV	39 30	119 47	4418	1966		NWS	419	677	62	10
RIALTO	34 06 15	117 21 10	1210			SEC				48
RICHMOND	37 56	122 21	100	1970	1975	BAP	403	690	58	50
RICHMOND FIELD STA	37 56	122 24				UCB				
RIDGECREST	35 36 55	117 40 10	2285	1976		SEC	498	708	70	48
RIVERSIDE	33 58 00	117 20 05	1018	1930		NWS	438	720	61	10
RUTH RESERVOIR	40 23	123 27	2550	1967	1967	DWR		670		A
SACRAMENTO	38 33	121 26	25	1976		CSU				2
SALINAS-HARTNELL	36 41	121 37	85	1974		DWR	370	700	53	A
SALTON SEA	33 30 30	116 03 30	-225	1967	1968	GS	502	724	69	10
SAN DIEGO STATE UN	32 46 38	117 04 51	450	1974		SDG	451	729	63	48
SAN FRANCISCO	37 47	122 25	50	1970		BAP	388	691	56	48
SAN JOSE	37 21	121 54	70	1963		CSU		695		48
SAN JOSE	37 21	121 54	70	1969		BAP	430	695	62	50
SAN LUIS DAM	37 03	121 04	277	1966		DWR		697		A
SAN LUIS OBISPO	35 18	120 40	300	1969		DWR		711		A
SAN RAFAEL	37 58	122 32	25	1970		BAP	429	705	61	50
SAN VICENTE	32 55	116 55	660	1957	1959	GS	499	728	69	10
SANDY BEACH	33 11 25	115 50 10	-225	1961	1962	GS		726		T
SANTA MARIA	34 54	120 27	268	1950	1975	NWS	433	714	61	T
SANTA ROSA	38 31	122 43	450	1972	1972	BAP		685		T
SANTA ROSA						OCL				C
SCHRAMM RANCH	36 34 27	120 07 55	177	1975		HAR		701		S
SHAFTER	35 32 00	119 16 40	307	1975		DA	461	709	65	T
SODA SPRINGS	39 19 33	120 22 00	6885	1946		FS	449	678	66	50
SOLEDAD CTF	36 28 26	121 22 34	230	1963		DWR	403	701		A
SPRING VALLEY	32 44	116 55		1976		SDG		729		48
STOCKTON						DWR				T
STOCKTON 9S	37 50 06	121 14 18	27	1960	1961	DWR		691		A
THORNTON 2S	38 11 48	121 24 36	7	1963	1968	DWR	437	688	63	A
TRANQUILLITY	36 39	120 15	165	1976		BR		700		48
UPPERLAKE 1SE	39 09 25	122 53 35	1330	1970	1972	DWR		680		A
VACAVILLE	38 22	121 57	100	1976		BR		686		S
VALLEJO	38 06	122 16	50	1972	1975	BAP	394	688	57	50
VICTORVILLE	34 32 40	117 16 50	2855	1976		SEC	496	717	69	48
VILLA PARK	33 48 55	117 50 50	254			SEC				48
VISALIA	36 19 50	119 17 55	326			SEC				48
WALNUT	34 00 30	117 57 50	352	1976		SEC	411	720	57	48
WARM SPRINGS DAM	38 43 00	122 58 54	224	1973	1975	CE	305	682	44	A
WASCO 8SW	35 31 50	119 26 42	280	1975		UC		709		A
WELDON AZ						BR				
WILLOWS 6S	39 25 43	122 11 04	95	1958	1967	DWR		678		A
YUCA VALLEY	34 07 25	116 24 50	3360	1976		SEC	498	719	69	48
YUMA	32 50 15	114 23 45	324	1952		USA	518	729	71	T

TABLE 1. SOLAR RADIATION STATIONS IN CALIFORNIA AND ADJACENT STATES

Explanation of Column Headings

RB = Year record began
RE = Year record ended
SU = Source of Data:
- ARS = U.S.D.A. Agricultural Research Service
- BAP = Bay Area Air Pollution Control Service
- BR = U. S. Bureau of Reclamation
- CE = U. S. Army Corps of Engineers
- CSU = California State University
- DA = U. S. Department of Agriculture
- DRI = Desert Research Institute
- DWR = California Department of Water Resources
- FS = U. S. Forest Service
- GS = U. S. Geological Survey
- HAR = Harza Agricultural Services
- HM = Hopkins Marine Station
- JPL = Jet Propulsion Laboratory
- LBL = Lawrence Livermore Laboratory
- NWS = National Weather Service
- OCL = Optical Coating Labs, Inc.
- PG = Pacific Gas and Electric Company
- SC = City of Santa Clara
- SDA = Sandia Laboratory
- SDG = San Diego Gas and Electric Company
- SEC = Southern California Edison Company
- SF = Superior Framing Company
- UC = University of California
- UCB = University of California, Berkeley
- UCD = University of California, Davis
- USA = U. S. Army
- USN = U. S. Navy

AVG = Average Daily Langleys
ETR = Extraterrestrial Radiation
%E = Average Daily Langleys as a percentage of Extraterrestrial Radiation
TP = Type of Instrument
- 2 = Eppley Laboratory Double-Dome Precision Spectral Pyranometer
- 10 = Eppley Laboratory Lightbulb Type, approx 10 Therm pile Junctions
- 48 = Eppley Laboratory Thermopile Type Model 8-48 (black and white)
- 50 = Eppley Laboratory Lightbulb Type, approx 50 Thermopile Junctions
- 75 = Spectrolab SR-75 Double-Dome Thermopile Pyranometer
- A = Actinograph (Bimetallic Mechanical Pyranometer
- C = Tilted Thermopile Pyranometer
- G = Thermo Radiometer Teledyne Geotech Model 188-01
- K = Kahl SCI Instrument Corporation Star Pyranometer
- M = Moll-Gorczynski Pyranometer
- S = Solameter (Photovoltaic Cell Pyranometer)
- T = Assumed to be Thermopile Type
- WM = Weather Measure Model R413 Star Pyranometer

TABLE 2

BASIC CRITERIA FOR CLASSIFICATION OF PYRANOMETERS[1/]

Criterion	Class 1	Class 2	Class 3
Sensitivity (mW/cm^2) %	± 0.1	± 0.5	± 1.0
Stability (% change per year)	± 1	± 2	± 5
Temperature (maximum error due to changes of ambient temperature) %	± 1	± 2	± 5
Selectivity (maximum error due to departure from assumed spectral response) %	± 1	± 2	± 5
Linearity (maximum error due to nonlinearity not accounted for) %	± 1	± 2	± 3
Time Constant (maximum)	25 sec	1 min	4 min
Cosine response (deviation from that assumed, taken at sun elevation 10° on a clear day) %	± 3	± 5-7	± 10
Azimuth response (deviation from that assumed, taken on a clear day) %	± 3	± 5-7	± 10
Errors in associated recording apparatus, %	± 0.3	± 1	± 3

1/ Source: Guide to Meteorological Instrumentation and Observing Practices, 4th ed., 1971, WMO No. 8TP.3, Secretariat, World Meteorological Organization, Geneva, Switzerland.

TABLE 3

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						ALPINE							
1975													
1976	437	410	297	278	308	270	430	499	556	694	580	623	298
1977		388	299	260									
MEAN	435	399	298	269	308	270	430	499	556	694	580	623	298
						ALTURAS 2SE							
1958									806	689	783	698	570
1959		429	270			262	437	668	808	760	830	723	515
1960		374	247	162									
1962					190	210	381	636	618				
1963					192	240	393	463	678	720	813	698	474
1964		327	173	148	172	323	430	603	635		706		
1965													
1969												718	518
1970		328											
MEAN	470	365	230	155	185	259	410	593	709	723	783	709	519
						ARVIN-FRICK							
1959					217	323	483	590	676	692	665	630	539
1960	467	412	303	211	257	298	437	548	655	694	636	628	529
1961	443	379	246	183	179	327	422	586	607	665	638	566	517
1962	442	365	251	165	223	243	423	557	628	666	654	608	520
1963	433	371	257	237	229	288	438	500	557	634	658	567	465
1964	428	322	221	146	201	341	406	509	592	651	648	582	516
1965	425	390	252	187	225	320	397	414	607	605	640	580	484
1966		401											
MEAN	444	377	255	188	219	306	429	529	617	658	648	594	510
						BAKERSFIELD 10S							
1969									524	535	568	496	400
1970		302	218	180	183	284	348	482	549	526			
1971													
MEAN	377	302	218	180	183	284	348	482	537	531	568	496	400

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						BARRETT RESERVOIR							
1959													
1960				238	290	336	501	610	632	715	677	642	528
1961		414	80		274	396	446	618	658	711	614	581	534
1962													
MEAN	468	414	80	238	282	366	474	614	645	713	646	612	531
						BARSTOW							
1976					305	351	484	583	670	719	626	640	435
1977		410	318	268									
MEAN	484	410	318	268	305	351	484	583	670	719	626	640	435
						BARSTOW-DIRECT							
1976					601	520	620	676	755	839	696	784	396
1977		614	526	521									
MEAN	629	614	526	521	601	520	620	676	755	839	696	784	396
						BLYTHE							
1976					308	349	501	589	660	708	613	641	471
1977		419	330	271									
MEAN	488	419	330	271	308	349	501	589	660	708	613	641	471
						BLYTHE-DIRECT							
1976					543	453	613	681	727	814	696	817	496
1977		598	576	479									
MEAN	624	598	576	479	543	453	613	681	727	814	696	817	496
						BOULDER CITY, NEVADA							
1974						392	440	646	704	732	652	624	537
1975	475	390	305	236	282	347	406	588	666	706	653	617	508
1976	471	414	299	252	288	308	482	561	655	723	607	628	434
1977		384	289	236									
MEAN	480	396	298	241	285	349	443	598	675	720	637	623	493

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BOULDER CITY, NEVADA-DIFFUSE													
1974													
1975				77	79	112	132	190	172	196	152	127	100
1976	100	78	69	47	51	87	115	159	155	122	134	90	97
1977		63	40	47									
MEAN	110	71	55	57	65	100	124	175	164	159	143	109	99
BOULDER CITY, NEVADA-DIRECT													
1974													
1975				445	518	490	383	607	719	743	711	797	706
1976	663	684	533	550	613	563	647	589	745	895	723	855	557
1977		657	655	537									
MEAN	642	671	594	511	566	527	515	598	732	819	717	826	632
BRAWLEY													
1962					313	365	514	613	673	704	683	631	537
1963	514	445	323	275	294	483	520	602	880	738	917	825	544
1964	510	420	319	291	317	416	502	639	690	735	635	600	560
1965	499	405	331	266	281	395	508	592	673	736	650	604	546
1966	493	451	278	258	301	388	486	622	684	694	628	608	521
1967	500	434	340	298	328	422	496	600	678	711	622	566	503
1968	513	454	329	287	324	374	498	650	700	719	644	616	558
1969	509	458	362	303	309	408	541	653	688	687	585	599	518
1970	446	459	341	328	328	334	421	527	574	592	524	471	449
1971	400	343	254	198	246	327	435	513	560	598	512	418	391
1972		292	213	171									
MEAN	486	416	309	268	304	383	492	601	660	691	620	574	513
BRENDA 2N													
1962									644	677	691	640	513
1963	436	351	244	156	180	274	453	525	613	698	711	588	438
1964		331	175	54									
MEAN	433	341	210	105	180	274	453	525	629	688	701	614	476
BURLINGAME													
1971													
1972				178	217								
1973													
1974				158	182		325	551	642	639	636	554	461
1975		335	248	182		274	384	459	616			553	430
1976		332	250	204	233	284	411	477					
1977													
MEAN	419	334	249	181	211	279	373	496	629	639	636	554	446

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
BUTLER VALLEY RANCH													
1970													
1971				110	136	162	220	316	421	420	526	450	379
1972	318	218	156	118	116	156	279	422	463	534	537	491	330
1973	324	186	131	108	118	164	260	453	479	551	563	506	374
1974	310	212	94	109	137	161	219	381	499	491	537	461	421
1975		218	144	101	124	131	218	266	287				
1976													
MEAN	305	209	131	109	126	155	239	368	430	499	541	477	376
BUTTONWILLOW 1S													
1965											628	548	481
1966		384	226	134	305	416	545	596					
1967													
MEAN		384	226	134	305	416	545	596			628	548	481
CHULA VISTA													
1975													
1976	400	379	290	245	286	292	432	493	479	607	420	580	297
1977		370	297	251									
MEAN	400	375	294	248	286	292	432	493	479	607	420	580	297
COACHELLA													
1966					247	326	532	866	618	639	578	523	488
1967	436	373	273	231	230	345	376	590	592	654	592	530	448
1968	420	437	262	206	279	302	401	567	455	546	552	537	495
1969	419	376	285	224	200	282	411	524	572	604	575	532	446
1970		354	236	196				508	602	612	555	483	460
1971	394	324	224	175	216	262	397	490	543	582	561	492	459
1972	386	352	235	171	210	282	413	464	537	513	569	468	415
1973		264	231	188	215	233	355	496	570	589	569		
1974													
MEAN	415	354	249	199	228	290	412	563	561	592	569	509	459
COALINGA-ALLEN													
1975													
1976				232	224	255	395	481	616	644			
1977													
MEAN				232	224	255	395	481	616	644			

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						COIT RANCH							
1974													
1975			233	145	188	283	491	499	622	655	640	572	468
1976		376	295	211	228	312	407	513	624	645			
1977													
MEAN	436	376	264	178	208	298	449	506	623	650	640	572	468
						COON CREEK							
1961							378	516	559	617	623	520	484
1962	405	371	268	140	120	153	300	504	606	703	662	581	451
1963	355	252	175	109	133	178	324	376	516	641	658	534	368
1964	372	264	128	90	121	212	306	488	573	591	668	580	444
1965		284	151	101	97		312	332	577	599	628	493	384
1966	369	256	129	96	122	203	320	457	587	623	683	548	407
1967													
MEAN	371	285	170	107	119	187	323	446	570	629	654	543	423
						COVELO 1NW							
1966						281	393	556	636	661		598	489
1967		356	186	147		283	315	425	658		714	635	502
1968		371	229			249	395	645	636		693	556	505
1969		327	185	150		200	449	531					
1970													
MEAN		351	200	149		253	388	539	643	661	704	596	499
						CUMMINGS VALLEY							
1965					305	381	467	404	602	607	728	609	508
1966	485	421	333	241	307	365	473	620	532	534	735	689	574
1967	494	456	302	267	289	413	478	489	641	759	705	637	490
1968		475	299	262	264	328	415	511	617	752	714	677	
1969	501	462	324	244	261	293	494	598	691	676	757	672	537
1970	459	389	294	221	192	328	450	529	691	664	617	601	527
1971		350	206	191	225		408	493	522	625		610	512
1972		375	230	196									
MEAN	473	418	284	232	263	351	455	521	614	660	709	642	525

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						DAVIS							
1942													505
1943	455	343	234	135	198	274	390	498	682	765	742	650	549
1944	470	377	248	169	187	291	477	532	680	739	752	666	520
1945	461	374	211	161	169	327	383	638	632	733	727	647	528
1946	504	385	269	179	289	332	444	702	735	811	728	643	526
1947	447	377	223	125	203	248	381	576	657	714	739	639	484
1948	435	322	261	160	236	281	374	442	600	697	691	701	451
1949		370	252	132	242	254	354	586	617	716	676	669	
1950	435	403	244	204	186	295	371	535	619	711	692	514	448
1951	431	330	201	103	139	246	433	514	638	682	691	662	538
1952	434	379	217	159	153	261	392	500	673	678	662	631	502
1953	439	353	236	118	183	336	429	525	596	671	688	616	516
1954	437	382	178	193	168	224	361	537	673	695	710	606	520
1955	442	366	161	104	153	290	441	495	670	734	733	641	520
1956	424	313	167	98	114	294	449	485	613	726	684	634	505
1957	437	338	250	186	205	168	374	554	582	750	700	631	503
1958	422	292	252	138	146	180	353	553	651	682	692	626	503
1959	454	357	255	181	165	267	444	566	676	728	708	625	474
1960		380	282	198	175		437	576	670	752	689	635	506
1961	450	354	207	167	139	298	408	574	671	735	731	600	519
1962	475	386	244	156	226	246	429	593	685	765	746	680	539
1963	451	330	267	166	199	279	414	483	602	765	756	660	489
1964	466	372	195	108	188	394	450	647	695	667	722	656	501
1965	415	338	205	152	138	299	338	413	634	702	684	595	485
1966	449	237	204	137	216	300	441	598	664	710	718	635	522
1967	444	384	204	126	188	297	400	485	688	670	730	643	514
1968	467	386	227	217	193	260	429	611	665	729	732	610	543
1969	451	353	192	171	149	217	465	577	711	674	732	651	520
1970	462	348	231	159	164	290	450	590	662	699	728	671	554
1971	453	376	199	151	191	331	427	594	565	704	706	658	538
1972	463	400	262	182	185	294	482	573	650	669	724	624	505
1973	452	322	194	159	182	229	389	605	698	720	711	675	536
1974	457	370	190	138	174	316	352	578	721	740	704	660	545
1975	444	371	249	156	196	265	369	532	697	701	673	617	497
1976	434	341	240	172	218	251	468	537	687	665	610	574	442
1977	439	366	206	206	172	314	431	568	556	657	698	587	508
1978		381	264	140									
MEAN	449	357	226	156	184	278	412	553	655	713	709	635	510
						DAVIS CORRECTED							
1957					192	176	351	521	546	704	657	592	472
1958	408	275	236	130	140	172	340	532	627	657	666	613	503
1959	442	352	248	176	160	260	433	551	658	708	690	609	461
1960		370	275	192	170		384	548	637	714	655	603	480
1961	424	336	197	158	130	279	378	547	630	690	686	564	493
1962	445	362	228	146	212	230	402	553	644	716	700	639	506
1963	418	309	250	149	184	259	384	448	558	710	701	613	453
1964		345	180	100	174					642	695	645	542

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					DAVIS CORRECTED (Contd.)								
1965		366	222	164			347	424	650	679	702	610	
1966			209	140	210	292	429	582	647		699	619	509
1967	427	374	198	122	175	281	374	454	645	656	712	626	501
1968		376	221	211	187	254	418		632	693	696	580	516
1969		335	182	156	141	206			676	650	695	619	494
1970	441	331	246	151	155	275	427	560	629	664	692	637	527
1971		357	189	143					551	686	688	641	524
1972		390	254	177					633	674	706	600	492
1973	432	313	185	154	172	224	381	575	663	685	677	642	509
1974		352	180							713	678	633	525
1975		357	240	150	189	255	355	512	670		681	624	503
1976		345	242	174									
MEAN	431	347	220	155	173	243	386	524	629	685	688	616	501
					DEL MAR								
1975													
1976			313	278	328	331	487	547	518	640	432	579	328
1977		390	314	274									
MEAN	431	390	314	276	328	331	487	547	518	640	432	579	328
					EL CAJON								
1976	460	428	342	292	320	329	469	536	604	694	518	644	339
1977		404	336	277									
MEAN	458	416	339	285	320	329	469	536	604	694	518	644	339
					EL CENTRO								
1963					256	393	489	585	662	686	650	548	459
1964	425	377	290	267	290	371	423	522	541	586	505	477	451
1965	413	324	264	219	256	337	461	534	610	618	491	470	371
1966	399	190	237	219	250	370	413	526	568	575	522	487	436
1967	417	347	267	230	261	341	396	500	565	581	554	505	454
1968	477	350	294	254	299	351	474	605	670	698	608	587	537
1969	485	436	330	282	271	360	531	630	639	684	579	577	504
1970	484	432	292	266	275	372	492	617	672	687	617	554	535
1971	469	411	307	244	296	384	498	591	640	663	594	516	483
1972	479	397	311	254	311	381	511	585	657	651	618	571	503
1973	486	331	323	260	308	347	465	624	673	689	648	589	569
1974		458	324	291	294	411	484	639	668	682	599		523
1975	498	414	330	283	317	386	459	585	681	708	644	632	534
1976	507	455	362	284	311	339	521	619	680	731	637	666	483
1977		449	352	302									
MEAN	466	384	306	261	285	367	473	583	638	661	590	552	489

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					EL CENTRO-CORRECTED								
1968					314								
1969		643	347	297	285	369	498	637	705	734	634	617	548
1970													
1972					327	400	537	615	691	685	650	600	529
1973	500	348	340	273	315	356	476	640	690	706	664	604	583
1974		469	332	299	300	421	496	655	684	699	613		536
1975	510	424	338	289	325	395	470	599	698	725	660	647	547
1976		467	371	291									
MEAN	512	470	346	290	311	388	495	629	694	710	644	617	549
					EL SEGUNDO								
1976					304	307	484	536	508	650	515	544	354
1977		373	306	269									
MEAN	429	373	306	269	304	307	484	536	508	650	515	544	354
					EL DORADO, NEVADA								
1976					299	336	477	565	653	712	589	637	443
1977		373	290	257									
MEAN	469	373	290	257	299	336	477	565	653	712	589	637	443
					ESCONDIDO								
1975													
1976	403	418	305	243	286	273	413	500	469	623	472	560	278
1977		375	286	245									
MEAN	401	397	296	244	286	273	413	500	469	623	472	560	278
					FINLEY 2SW								
1972													
1973		326	221										
MEAN		326	221										
					FIVE POINTS								
1972								568	683	697	687	622	476
1973	445	321	165	135	214	257	369	608	679	730	702	624	538
1974	457	388	246	135	216	332	395	580	683	710	672	618	510
1975	421	361	266	155	197	260	363	523	462	701	666	608	492
1976	413	394	260	188	219	262	422	495	592	622	598	514	394
1977	377	311	156	179	102	243	356	459	461	506	686	580	481
1978		378	250	120									
MEAN	426	359	224	152	190	271	381	539	593	661	669	594	482

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						FOLSOM DAM							
1974										717	651	625	488
1975	409	311	180	110	157	213	282	467	673	720	706	605	480
1976	408	291	184	144	171	205	376	498	650	698	671	544	460
1977	391	364	297	239	107	225	285	403	380	586	718	603	487
1978		381	249	130									
MEAN	405	337	228	156	145	214	314	456	568	680	687	594	479
						FREMONT							
1970												549	485
1971	384	314	179	150	201	269	358	499	493	585	579	537	442
1972		355	244	172	225	271	399	501	564	621	602		
1973													
1974				182	205	330				703	684	624	507
1975		375	285	215	268	308	391	545	703			596	347
1976			203	155	220	272	455	541	661	703	694	465	
1977													
MEAN	424	348	228	175	224	290	401	522	605	653	640	554	445
						FREMONT-CORRECTED							
1970													519
1971	401	335	191	170	208	279	372	518	512	608	602	558	459
1972		368	253	178	231	278	409	514	578	637	617		
1973													
MEAN	415	352	222	174	220	279	391	516	545	623	610	558	489
						FRESNO							
1928													
1929	462	366	249	140	173	346	462	564	687	703	711	627	514
1930	467	382	274	154	185	324	430	577	746	739	674	627	496
1931	462	393	257	206	189	306	457	564	658	691	702	591	529
1932	466	404	266	155	200	294	446	564	651	727	712	649	519
1933	471	414	291	165	152	354	453	592	644	704	705	638	537
1934	478	400	303	159	163	266	468	644	684	714	738	648	548
1935	475	464	232	164	185	279	467	534	685	760	731	650	545
1936	474	408	259	206	212	279	459	587	704	686	689	649	553
1937	471	367	283	151	230	293	415	592	698	722	690	668	546
1938	454	397	274	174	156	275	401	536	659	721	716	645	489
1939		345	273	139	168	294	406	579	663	730		638	497
1940	459	396	279	181	123	254	441	567	675	706	737	623	529
1941	445	379	263	163	160	192	399	536	681	718	697	611	536
1942	436	352	237	166	155	311	443	478	667	608	693	607	509
1943		374								712	683	655	520
1944	452	385	262	176	211	277	470	532	645	700	711	538	522

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					FRESNO (Contd.)								
1945	444	352	216	171	154	313	391	597	627	701	687	618	498
1946	455	335	203	119	202	309	414	595	647	717	663	661	595
1947	465	405	229	109	180	242	445	607	669	725	764	670	532
1948	482	367	261	166	251	334	451	527	705	763	737	677	549
1949	480	399	292	147	258	310	400	605	666	747	741	640	555
1950	492	388	262	187	199	336	445	644	717	781	742	707	497
1951		378	198	123	168	332	481	540	696	737	742		
1952	476	433	274	171	199	320	396	543	702	739	677	661	595
1953				175	232	393	527	620	713	786	770	703	563
1954	489	444	260	232	253	293	428	590	707	739	711	660	547
1955	466	417	225	134	150	326	482	545	642	750	732	638	554
1956		413	266	145	178	363	536	523	619	744	691		516
1957	429	355	283	200	208	191	416	539	559	669	641	597	493
1958	408	342	244	142	174	246	354	513	594	641	622	554	466
1959	427	352	251	183	167	279	442	536	629	655	606	550	471
1960	414	362	255	188	199	250	420	516	604	634	555	542	441
1961	399	340	201	145	134	276	401	525	570	605	623	515	454
1962	435	335	229	112	161	194	397	537	572	723	756	687	513
1963		392	260	166		261	434	508	639	713	738	642	480
1964		353	191		182	347	430	577	657	701	715	619	532
1965	437	372	244	147	161	314	410	478	684	689	671	583	494
1966	452	396	206	146	221	308	447	592	629	686	681	621	491
1967	424	362	217	99	163	268	382	456	660	688	678	617	497
1968		402	201	198	184	226	409	601	665				
1969	403	298	184	149	102	218	412	530	626	626	636	580	473
1970	467	338	240	166	192	302	462	596	705	697	696	652	554
1971	456	385	246	166	199	301	460	560	577	749	701	613	519
1972	452	388	251	167	147	310	473	569	669	681	678	615	478
1973		339	178	150	200	241	345	570	635	683	682	588	
1974					171	295	363	531	670	696	696	589	487
1975	432	319	232	148	193	280	361	514	660	702	667	615	492
1976	444	362	255	194	226	267	438	520	664	699	674	584	448
1977		375	201	218			402	558	549	605	670	560	468
1978		340	242	136	140								
1979													
MEAN	453	376	245	162	183	289	431	556	656	704	694	622	514
					FRESNO-CORRECTED								
1959					178	302	478	580	681	709	656	595	509
1960	450	392	276	203	218	274	427	566	663	696	609	595	484
1961	438	373	220	158	146	303	440	576	626	664	684	565	498
1962	451	368	251	122	179	215	442	598	637	707	710	645	539
1963	431	368	244	155	212	248	413	483	608	678	701	610	456
1964	432	336	181	90	175	334	414	555	632	675	688	596	512
1965	422	358	235	142	155	302	395	459	658	663	645	579	475
1966	440	381	198	141	215	300	435	577	613	669	664	605	479
1967	413	352	212	96	161	261	372	444	643	671	660	601	484
1968		391	195		179	221	399	586	648				
1969			196	158	109	232	440	565	668	668	679	619	505

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
FRESNO-CORRECTED (Contd.)													
1970	455	361	256	177	184	290	444	573	679	670	669	627	533
1971	444	370	237	159	193	293	448	545	562	730	683	597	505
1972	450	378	244	162	146	310	473	568	668	680	677	614	477
1973	430	338	177	149	202	243	349	577	643	691	690	595	509
1974	440	366	229	126	175	302	372	545	687	714	661	604	500
1975	443	327	238	150	198	287	370	527	677	720	684	630	505
1976		371	262	198									
MEAN	439	364	227	149	178	277	418	548	647	688	673	605	498
GLENBURN O.3SE													
1963					189	234	359	427	548	662	706	604	420
1964		284	128	127	132	300	374						
1965					137	240	347	396	610	618	702	590	516
1966		364	190			314	430	601	669				
1967													
MEAN	409	324	159	127	153	272	378	475	609	640	704	597	468
GUADALUPE													
1962												567	
1963		359	244	190	212	297	455	547	513	622	620		435
1964	447	338	257	240	277	380	447	559	594	633	609	530	500
1965													
MEAN	435	349	251	215	245	339	451	553	554	628	615	549	468
HUNTINGTON BEACH													
1976					298	305	467	525	529	628	515	600	342
1977		381	307	269									
MEAN	431	381	307	269	298	305	467	525	529	628	515	600	342
INYOKERN													
1967					297	369	487						
1968		428	279	259	286	337	483	613	667	685	648		
1969					247	300	484	611	678	661	652	601	
1970					244	338	485		685	697	622	600	531
1971		389					483	587	649	708	653	561	512
1972	468	396	286	322	278	347	487	561	649	639	616	566	472
1973	443	332	260	242	259	301	434	567	601	652	632	545	489
1974		374	276	220	214	343	417		638	662	604		465
1975	430	339	271	211	255	319	411	517	598	633	596	564	441
1976	431	360	292	220	254	303	444	546	591	643	578	547	398
1977		352											
MEAN	457	371	277	246	259	329	462	572	640	664	622	569	473

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						INYOKERN-CORRECTED							
1954									682	717	673	652	554
1955	499	420	301	250	257	374	516	621	681	721	683	608	554
1956	496	434	328	233	246	401	515	591	675	706	642	640	544
1957	496	421	340	275	244	331	493	584	652	709	697	647	557
1958		382	310	251	286		443	595			699	604	544
1959		409	313			359	515	599	689	726	650	610	538
1960		401	318	237	259	325				694	651	633	516
1961		409	283	265	281	358	509	612					
1962					284	333	485	628	691	737	705	654	549
1963	485	416	297	256	282	368	475	588	650	693	711	604	476
1964		376	296	267									
1967													
1968		439	285	265	292	344	495	628	683	702	664	622	
1969			304	247	252	307	496	626	694	677	668	616	
1970					249	346	497		702	715	637	614	545
1971		398	279	233			495	602	665	726	669	575	524
1972	496	428	308	239	300	373	525	606	701	690	665	611	508
1973	484	358	281	261	283	328	475	621	658	714	691	596	537
1974	499	410	302	240	240	386	463	657	718	745	680	629	523
1975		381		237	291	364	469	590	683	723	676	643	503
1976		407											
MEAN	492	406	303	250	270	353	492	610	682	712	674	621	531
						INYOKERN-CHINA LAKE							
1950													
1951			340	269	304	433	554	640	756	810	767		
1952					269	383	516	624	735	768	711	714	
1953				237	305	410	557	663	766	828	754	727	640
1954		500	358	310	319	465	572	727	801	842	790	766	
1955	584	471	354	295	303	439	606	729	799	847	803	714	651
1956	593	510	385	274	290	478	618	709	810	847	771	768	653
1957	600	505	409	330	293	397	591	760	782	851	836	776	669
1958	584	458	372	302	344	368	531	717	814	883	839	725	653
1959	604	491	376	323	364	435	628	735	844	872	789	740	652
1960			390	291									
1961					356	453	643	773	858	886	837	728	654
1962	618	463	355	317	352	413	601	778	857	912	873	811	680
1963		516	368	317	350			728	805				
1964					352	487	620	750	832	896	867		
1965		474	350		335	468		676	844	851		735	642
1966		503	286	277	339	422	599	791	850	860	864	757	
1967			288	253									
MEAN	590	489	356	292	325	432	587	720	810	854	808	747	655

8—77733

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						JOLON							
1971							484	564	630	745	743	640	555
1972	490	412	292	200	272	352	497	581	697	700	730	632	518
1973	458	313	247	199	227	240	411	598	667	714	730	618	533
1974	469	377	248	214	205	342	361	569	670	728	710	664	534
1975	466	368	264	195	257	286	386	519	680	712	698	655	567
1976		417	305	251	275	284	609	544	736	703			
1977													
MEAN	478	377	271	212	247	301	458	563	680	717	722	642	541
						KERMAN 2ESE							
1964					186	321	411	552	603	648	693	553	496
1965		366	229	152									
MEAN	434	366	229	152	186	321	411	552	603	648	693	553	496
						LA JOLLA							
1928											545	430	293
1929	361	296	291	277	261	312	395	403	468	450	452	435	295
1930	351	296	288	270	193	256	376	416	445	438	477	393	365
1931	342	319	261	241	244	274	380	365	384	463	495	331	349
1932	345	354	260	209	278	283	403	449	453	478	407	337	233
1933	313	241	241	190	218	294	354	322	422	409	330	407	328
1934	418	278	322	268	303	292	346	489	624	523	551	530	489
1935		371						518	552	519	596	479	402
1936	425	384	290	239	265	309	413	473	606	604	533	538	450
1937	406	315	303	224	264	312	464	529	459	558	523	486	438
1938	406	334	271	237	281	304	435	526	522	489	505	521	444
1939	420	377	328	232	264	378	365	454	566	599	587	488	405
1940	409	411	266	263	226	331	412	526	530	429	556	506	446
1941	409	368	294	219	236	289	417	458	568	548	534	502	470
1942		350	295	232	258		466	459	611	462	544	501	444
1943			299	226	240	338	413	434	534	569	570	510	418
1944	403	338	305	214	254	335	450	526	485	542	538	501	347
1945		300		226	234	340	407	446	521	398	456	434	415
1946		302	290	206	275	325	387	446		604	523	517	412
1947	393	356	256	177	269	313	403	469	484	464	606	529	392
1948	395	317	262	221	233	312	416	507	574	502	505	478	410
1949	364	263	297	204	209	286	434	440	481	383	493	485	390
1950		318	262	213							498	474	393
1951													
MEAN	388	328	284	228	250	310	407	460	514	497	514	470	393

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
LA JOLLA-CORRECTED													
1933													315
1934	405	266	309	257	291	280	371	472	600	502	529	509	470
1935		356							551	527	600	478	401
1936		373	288	238							520	528	438
1937	400	310	297	220	259	307	457	522	452	550	518	484	429
1938	403	329	267	233	280	302	433	521	521	485	504	520	443
1939	415	376	327	231	261	373	357	448	557	590	575	481	399
1940	408	405	261	259	231	329	410	525	526	428	558	515	444
1941	412	367	293	218	237	289	424	463	576	568	532	508	469
1942		354	299	231	257		465	458	609	460	537	499	443
1943		332	297	232									
MEAN	407	347	293	235	259	313	417	487	549	514	541	502	425
LAGUNA BELL													
1976					317	325	493	482	509	631	551	584	313
1977		346	280	242									
MEAN	423	346	280	242	317	325	493	482	509	631	551	584	313
LAKE MEAD (ARIZONA-NEVADA)													
1952							474	586	728	747	677	645	528
1953	509	427	295	242	280	395	533	607	722	765	629	634	573
1954													
MEAN	505	427	295	242	280	395	504	597	725	756	653	640	551
LAKE MOJAVE (ARIZONA-NEVADA)													
1959													
1960	524	423	311	286	312	409	508	654	706	725	666	737	546
1961		412	309	260	306	336							
1962													
MEAN	519	418	310	273	309	373	508	654	706	725	666	737	546
LANCASTER													
1976					312	341	505	608	702	738	686	653	466
1977		422	327	276									
MEAN	503	422	327	276	312	341	505	608	702	738	686	653	466
LANCASTER-DIRECT													
1976					606	489	633	682	798	891	780	872	472
1977		627	618	537									
MEAN	667	627	618	537	606	489	633	682	798	891	780	872	472

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						LAS VEGAS							
1960					284	354	558	628	738	745	711	653	533
1961	518	418	311	274	306	390	514	659	719	761	664	618	586
1962	527	423	327	269	308	364	529	670	705	757	728	678	566
1963	517	426	314	264	290	388	516	626	711	764	748	617	538
1964	514	399	310	286	308	407	512	601	712	739	699	616	578
1965	493	440	289	255	285	407	486	558	675	702	634	627	562
1966	504	424	263	226	294	381	491	670	711	715	691	653	526
1967	495	425	297	225	278	409	489	625	707	752	652	588	498
1968	508	448	283	245	291	356	519	658	721	736	657	612	568
1969	491	420	331	258	256	329	493	646	689	705	639	612	508
1970		407	287	249	254	332	488	606	691	699	577		
1971				253	278	372	503	616	648	732		557	556
1972		373	277	203	278	361	479				680	605	487
1973	460	303	274	238	259	304	392	604	649	689	681	588	537
1974	476	407	284	218	200	349	443	642	683	717	630	616	524
1975	468	368	279	223	266	333	414	567	651	709	704	607	493
1976		387	271	255	269	319	477	525	670	716			
1977			288	386		386	501	611	602	698	668	588	507
1978		405	289	217	219								
1979													
MEAN	494	405	293	252	274	363	489	618	687	726	673	615	535
						LAS VEGAS-CORRECTED							
1954											595	580	521
1955	503	401	293	241	288	424	559	655	721	762	637	528	529
1956	506	401	291	212	257	416	551	658	733	786	623	629	518
1957													
1958												559	502
1959	470	398	289	250	262	343	492	595	658	672	614	571	498
1960	473	397	303	220	260	325	485	577	678	684	654	600	489
1961	476	384	286	251	281	358	472	606	661	700	606	568	538
1962		389	300	247						757	728	633	514
1963	473	387	285	240	263	352	469	568	646	694	681	580	506
1964	483	375	291	269	289	383	481	566	670	696	658	580	543
1965		413	292	239				518	627			583	522
1966	470	394	244	210	273	358	456	622	661	665	645	615	495
1967	466	399	279	218	261	384	460	588	665	707	613	553	469
1968		422	266	230	273	340							
1969												604	501
1970		401	283	245	250	327	482	598	682	690	569		
1971				248	271	362	490	600	632	713		543	
1972											680	605	490
1973	460	303	274	238	259	304	392	604	648	689	681	588	539
1974											646	631	537
1975		377	285	229	272	341	428	582	667				
1976													
MEAN	477	389	284	237	269	358	478	596	668	709	642	586	512

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						LIVERMORE, BAP							
1970									576	595	618	556	
1971								540	627	740	693	672	565
1972	473	428	280	201	257	313	484	604	625	715	680	583	502
1973	433	320	221	188	204	222	377	576	614	638	687	660	491
1974		351											
MEAN	450	366	251	195	231	268	431	573	611	672	670	618	519
						LONG BEACH-CSU							
1972							374	532	559	547	626	523	421
1973	373	309	258	228	269	291	418	510	478	529	501	390	296
1974		235	160									441	381
1975	358	279	265	216	234	277	356	436	466	446	488	468	367
1976	359	306	280	205	251	294	379	445	446	526	434	487	257
1977	340	295	237	202	199	267	361	405	436	434	474	407	362
1978		261	225	131									
MEAN	363	281	238	196	238	282	378	466	477	496	505	453	347
						LOS ANGELES AIRPORT							
1951													
1952			307	233	255	368	476	484	650	628	658	605	526
1953	502	368	295	264	283	418	550	559	739	692	716	634	501
1954	450	454	319	299	267	407	461	472	504	578	618	523	500
1955	446	369	280	247	263	377	478	592	539	544	601	577	484
1956	430	304	274	179	214	356	499	462	509	620	648	551	538
1957	446	362	336	265	215	255	445	518	597	592	660	605	504
1958	462	344	277	243	281	320	390	554	591	706	652	586	598
1959		396	286	231	256	312		536	596	628	639	584	471
1960	452	361	291	208	236	319	451	574	633	554	695	592	508
1961	460	390	268	273	277	386	479	581	613	590	612	574	479
1962	444	370	280	224	281	290	462	564	625	526	620	609	482
1963	434	353	258	233	237	315	480	580	500	524	664	587	481
1964	461	357	282	277	288	411	469	553	613	541	678	566	496
1965	406	352	294	192	269	354	425	292	582	496	606	541	474
1966	438	377	234	235	303	373	406	514	489	617	662	598	443
1967	447	368	243	234	247	377	451	452	612	632	677	639	428
1968		428	300	286		291	473	605	629	573	627	584	458
1969	426	335	282	240	214	318	485	585	512	471	636	595	444
1970	454	393	264	217	204	345	456	618	603	588	645	592	519
1971	447	341	254	227	248	349	459	570	557	591	657	615	492
1972	435	382	281	210	260	329	393	582	579	566	644	550	438
1973	392	307	252	221	225	267	405	493	476	547	554	541	417
1974	450	387	281	228	203	383	404	660	553	625	641	564	467
1975	431	327	287	241	267	327	393	522	573	511	645	614	462
1976		395	318	254	306	323	524	570	612				
1977													
MEAN	446	368	282	238	254	343	455	540	579	581	644	584	484

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					LOS ANGELES CIVIC CENTER								
1951													
1952			254	200							699	630	526
1953	449	376	256	213	248	380	472	487	637	596	653	587	484
1954	429	392	284	261	235	385	382	435	524	577	632	539	502
1955	438	368	273	235	250	359	462	562	498	537	622	601	493
1956	430	332	276	186	214	337	508	423	485	636	650	564	553
1957	447	357	337	274	213	265	440	490	553	606	683	624	521
1958	448	330	280	240	274	288	350	540	585	689	662	592	546
1959	454	396	298	253	279	313	475	519	555	637	670	599	455
1960	469	368	316	230	264	326	469	591	632	620	652	627	533
1961	464	404	274	287	287	381	441	565	582	618	647	604	472
1962	445	367	278	233	271	254	417	545	605	544	674	647	507
1963	441	349	260	238	233	316	472	573	481	517	723	639	496
1964		359	280	269	293	414	476	531	635	585		588	512
1965		363		205	279	372	391	465	535	445	635	567	437
1966				241	278	302	293		482	628	665	602	477
1967		381	248	255	290	411	432	574	598	513		603	403
1968		389		240	259		455	572				582	457
1969		316	281	237	209	274		534	517	387	627	623	478
1970		387	275	225					505	568	641	614	534
1971		344	262	241	250	342			534	564	670	562	456
1972	416	366	266	204	266	324	410	534	523	542	614	520	426
1973	390	295	264	253	220	262	388	493	478	551	580	519	377
1974		358	262	220	192	329	316	565	436	524			
1975													
MEAN	437	362	276	237	253	332	424	526	542	566	653	592	484
					LOS BANOS EQUIPMENT YARD								
1959									658	657	599	553	468
1960	457	367	272	198	213	349	438	606	686	738	567	588	465
1961		348	232	172	167	327		598	666	663	643	554	503
1962		370	250		212	270	428						
1963													
MEAN	446	362	251	185	197	315	433	602	670	686	603	565	479
					MANDALAY								
1976					302	320	472	534	538	646	502	338	187
1977		402	335	290									
MEAN	406	402	335	290	302	320	472	534	538	646	502	338	187

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						MAZE BRIDGE 2S							
1962										708	683	617	513
1963	431	342	269	135	196	296	422	472	605	699	689	583	458
1964	421	345	180	89	178	348	395	541	595	621	673	587	496
1965		350	253	183	176	341	415	424	604				
1966													
MEAN	430	346	234	136	183	328	411	479	601	676	682	596	489
						MC ARTHUR 4ESE							
1958										739	732	693	595
1959													
MEAN										739	732	693	595
						MEDFORD, OREGON							
1953													
1954			131	88	116	260	388	538	670	599	767	608	496
1955	403	333	166	125	138	237	345	416	653	692	664	632	433
1956	377	272	149	101	117	204	374	481	525	629	644	585	446
1957		255	143	46									
1960					107	225	343	411	532	721	694	611	467
1961	385	279	144	116	140	183	284	505	554	674	711	568	465
1962	392	277	175	87	131	215	316	509	512	727	718	573	468
1963		236	146	94	157	193	347	397	548		675	606	458
1964			126	101	89	268	327	527	584	594	638	624	495
1965	386	302	126	92	87	243	384	433	618	622	692	534	501
1966	397	312	143	113	117	235	363	541	603	664	631	590	453
1967	399	326	140	97	110	222	329	429	631	691	721	615	477
1968	409	294	154	99	138	196	395	541	628	721	731	530	482
1969	395	302	113	104	113	185	405	472	645	576	725	646	455
1970	389	280	210	95	104	101	378	462	614	588	725	645	466
1971	358	297	132	98	114	194	282	428	482	593	650	571	452
1972	384	301	134	92	138	199	321	474	567	652	689	584	457
1973	389	294	133	110	125	221	296	509	599	652	695	599	430
1974	383	253	102	89	145	204	249	593	607	650	644	576	482
1975		307	152										
MEAN	389	289	143	97	121	210	340	481	587	650	690	594	466
						MEDFORD, OREGON- CORRECTED							
1951					80								
1952					118	192	290	472	581				432
1953	359	292	153	77	94	221	312	450	431	609	702	530	434
1954	365	261	116	77	102	230	343	475	593	530	678	537	439
1955		294	147	110	121	209	305	368	577				
1956										621	636	577	439
1957	368	251	136	73	125	205	252	466	577	705	626	577	418
1958	360	221	154	76	97	163	334	468	614	538	653	585	414
1959	368	307	112	84	102	191	324	471	548	614	679	575	389

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					MEDFORD, OREGON-CORRECTED (Contd.)								
1960	383	283	190	99	105	222	308	405	526	711	684	603	461
1961	369	275	141	115	138	180	277	479	526	641	676	540	441
1962	372	262	166	82	124	204	300	484	486	690	682	544	445
1963		224	137	89	149	183	329	377	521		642	575	435
1964			119	95	84	255	310	501	554	564	606	593	
1965										584	649	518	470
1966	372	292	134	106	109	220	340	508	566	623	592	553	425
1967	374	305	131	90	103	208	309	402	592	648	676	577	447
1968		276	145	92	129			495	575	661	670	485	441
1969	362	276	103	95	103	169	371	432	591	528	664	591	416
1970		256	192	86									
1973							288	495	583	635	677	583	418
1974		246	99	87	141	198			591	633	627	561	470
1975		299											
MEAN	368	272	140	90	112	203	312	456	557	620	657	561	435
					METZLER RANCH								
1976													
1977							431	525	692	719			
MEAN							431	525	692	719			
					NAPA								
1972										693	692	649	500
1973		285			197	237	364	483	536	560	543	488	367
1974		259	138	123	143	240	249	430	535	562	539	468	
1975													
MEAN	367	272	138	123	170	239	307	457	536	605	591	535	434
					NEWVILLE 1E								
1966												636	545
1967	420	396	176	136	113	314	394	354	681	635	709	627	508
1968	441	378	230	197	198	228	407	600	640	631	682	571	526
1969	439	358	182	155	163	193	419	548	708	711	725	642	458
1970	443	305	214	119	116	262	445	592	666	657	727	664	546
1971		377	180	140									
MEAN	436	363	196	149	148	249	416	524	674	659	711	628	517
					OAKLAND								
1970						305	425	525				536	486
1971	385	314	179	158	201	269	358	499	493	585	579	537	442
1972													
MEAN	392	314	179	158	201	287	392	512	493	585	579	537	464

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
OLD RIVER 3S													
1965													
1966			216	157	230	320	430	542	577	663	655	624	524
1967	428	400	256	144	230	275	419	444	604	643	662	597	465
1968		390	209	194									
MEAN	437	395	227	165	230	298	425	493	591	653	659	611	495
PARDEE													
1976					306	305	479	516	604	688	638	600	377
1977		391	307	281									
MEAN	458	391	307	281	306	305	479	516	604	688	638	600	377
PITTSBURGH													
1970						314	459	572	664	684	738	678	552
1971		370	166	136									433
1972	442	358	166	159	167	272	440	563	639	701	708	632	504
1973	426	316	212	163	169	217	402	554	648	663	658	608	497
1974	415	338	163	98	177	274	296	506	662	673	657	622	518
1975		298	212	121									
MEAN	434	336	184	135	171	269	399	549	653	680	690	635	501
PITTSBURGH - CORRECTED													
1970						291	435	531	616	634	685	629	513
1971		343											
1972					163	265	428	548	623	683	690	616	491
1973	427	307	191	159	167	219	407	561	656	671	667	616	503
1974		342	165	99	150	277	303						
1975													
MEAN	425	331	178	129	160	263	393	547	632	663	681	620	502
PLACERVILLE IFG													
1976									545	515	513	413	345
1977	357	263	170	129	137	214	332	487	427	577	629	520	400
1978		294	152	103									
MEAN	347	279	161	116	137	214	332	487	486	546	571	467	373
RED BLUFF 5E													
1967													
1968		342	195		182	289	372	414	657	670	681	601	489
1969			175			236	408	611	666		676	508	
1970						186	419						
MEAN		342	185		182	237	400	513	662	670	679	555	489

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
REDDING 5SE													
1958											639	576	
1959		340											
MEAN		340									639	576	
REDWOOD CITY													
1970						282	438	579	614	656	656	592	507
1971	420	334	206	154	203	303	386	526	565	657	638	577	485
1972	421	373	249	168	210	257	411	520	601	642	620	557	438
1973		270	206	167	146		352	568	623	628	651	568	447
1974	406	318	209	152	180	280	320	503	628	642	628	563	454
1975	402	302	226	166	223	261	334	443	630	648	631	540	421
1976		323											
MEAN	415	320	219	161	192	277	374	523	610	646	637	566	459
REDWOOD CITY - CORRECTED													
1970						289	449	594	650	672	673	607	520
1971	430	343	210	158	208	311	396	539	579	674	654	592	497
1972	441	382	255	171	220	270	433	548	633	676	653	586	461
1973		284	217	175			368	598	656	675	682	599	470
1974		334	192	160	189	294	336						
1975													
1976		354	254	204	244	269	446	533	680	677	653	502	
1977													
MEAN	438	339	226	174	215	287	405	562	640	675	663	577	487
RENO													
1966					214	268	419	572	605	587	661	571	460
1967		355	211	145		313	348	429	596	598	613	553	439
1968	413	342	198	194	212	257	420	532	591	622	591	503	490
1969	416	338	189	178	181	258	413	546	628	565	636	592	462
1970	411	338	245	183	184	307	423	482	589	513	607	580	485
1971	391	342	198	151	224	287	395	464	465	597	591	525	455
1972		309	194	145	175		391	483	567	537	585	452	335
1973	369	263	219	163	176	243	336	476	507	564	551	497	437
1974	385	292	189	151	183	302	309	476	574	615	547	533	449
1975	375	299	210	158	190	233	313	450	600	576	578	478	416
1976		286	212	168	183	98	378	400	484	498			
1977													
MEAN	391	316	207	164	192	257	377	483	564	570	596	528	443

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						RENO - CORRECTED							
1965													
1966				175	219	274	429	586	619	601	677	586	471
1967		363	216	148		321	357	440	611	613	629	566	450
1968	423	350	203	199	217	263	430	545	606	638	605	515	502
1969	426	346	194	182	186	264	423	559	644	579	652	606	474
1970		346	251										
1973					190	262	362	515	548	613	599	536	472
1974		315	204	162	198	335							
1975													
MEAN	419	344	214	173	202	287	400	529	606	609	632	562	474
						RENO-DRI							
1974								572	679	734	662	628	544
1975	450	353	259	174	236	329	392	506	670	691	687	612	493
1976	442	356	254	199	231	288	463	558	671	682	620	533	450
1977		374	257	216									
MEAN	454	361	257	196	234	309	428	545	673	702	656	591	496
						RENO DRI-DIFFUSE							
1974								200	173	134	122	98	72
1975	121	81	79	73	78	118	141	206	198	156	129	105	82
1976	105	84	60	47	68	88	113	162	162	141	118	117	103
1977		69	49	42									
MEAN	110	78	63	54	73	103	127	189	178	144	123	107	86
						RENO DRI DIRECT							
1974								582	775	892	807	829	826
1975	575	539	449	254	413	406	410	420	894	785	827	793	709
1976	584	539	490	410	410	396	622	614	744	802	742	649	585
1977		629	515	508									
MEAN	600	569	485	391	412	401	516	539	804	826	792	757	707
						RICHMOND							
1955						350	482	489	675	642	640	578	507
1956	489	404	266	259	157	369	559	648	758	772	608	582	491
1957		321	281	215									
1961					184	313	379	554	568	683	709	508	457
1962	411	304	226	158	213	290	381	548	620	617	564	581	433
1963	482	410	396	258	379	394	521	572	558	640	626	559	474
1964		337	226	250	202	380	430	543	606	586	624		

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
RICHMOND (Contd.)													
1965								481	526	506	542	483	406
1966	388	327	207	194	202	271	362	521	518	587	529	502	437
1967		331	198	149	165	291	343	450	582	439	602	552	
1968													
1970						268	370	453	481	492	500	438	401
1971	369	242	158	169	230	299	345	460	481	576	557	506	408
1972	364	299	192	152	193	233	406	454	498	550	514	485	387
1973	335	235	187	154	176	180	313	451	496	523	504	437	362
1974		277	148	145									
MEAN	404	317	226	191	210	303	408	510	567	586	578	518	433
RICHMOND - COR ECTED													
1970							443	543	577	590	600	525	480
1971		290				369	384	512	535	641	620	563	454
1972		333	213	169				514	565	621	580	548	437
1973	392	265	211	174	208	212	369	532	585	609	593	516	427
1974		327	175	167	188	296	327						
1975													
MEAN	403	304	200	170	198	292	381	525	566	615	598	538	450
RIDGECREST													
1976					304	356	502	605	678	729	665	646	472
1977		423	324	274									
MEAN	498	423	324	274	304	356	502	605	678	729	665	646	472
RIDGECREST DIRECT													
1976					611	619	652	704	757	885	759	854	554
1977		660	624	568									
MEAN	687	660	624	568	611	619	652	704	757	885	759	854	554
RIVERSIDE													
1930													397
1931													
1935					246	319	412	441	516	590	573	489	441
1936	423	355	300	221	245	286	414	509	577	625	554	522	464
1937	415	336	286	208	224	321	428	546	479	592	575	539	446
1938	422	366	256	218	255	282	394	613	539	531	678	486	442
1939	398	353	288	156	248	343	376	470	531	611	545	487	367

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					RIVERSIDE (Contd.)								
1940		391	284	228	203	308	388	466	578	578	628	571	
1941	414	368	284	190	218	247	387	457	561	606	642	508	500
1942	435	342	296	202	251	338	478	462	589	591	630	551	491
1943	416	366	296	222	237	327	359	426	558	591	594	544	477
1944		354	288	192	229	291	398			592	620	612	478
1945	430	386	264	230	268	309	435	546	575	533	613	539	456
1946	446	345	313	206	289	496	433	540	442	650	583	561	488
1947	442	381	272	230	306	342	393	524	544	613	665	575	464
1948		345	297	238	293	345	434	503	621	635	687	632	
1949	412	332	288	214	227	290	416	523	477	589	584	531	468
1950		401	279	215		300	383	437	503	623	570	522	441
1951		365	271	227	232		467	429	616	606	589	603	516
1952	476	427	312	234	252	345	442	488	708	676	683	638	506
1953	481	403	282	245	285	411	515	465	672	672	639	643	544
1954	489	452	319	301	269	428	412	550	616	671	668	616	560
1955	493	422	326	264	256	389	528	627	602	672	670	610	551
1956	481	382	300	237	244	384	530	499	622	707	671	621	577
1957	484	405	368	309	253	321	479	546	573	675	700	641	541
1958	480	363	318	260	300	332	423	563	618	735	694	589	560
1959	491	429	327	280	312	345	538	570	607	688	694	615	484
1960	508	417	355	261	306	363	501	619	666	705	706	650	549
1961	484	435	307	302	310	417	478	606	590	668	630	574	496
1962	480	363	272	231	276	289	446	606	646	661	725	681	563
1963	492	426	313	282	270	364	499	588	584	643	748	648	535
1964	498	408	323	324	330	465	490	570	666	662	666	562	507
1965		389	316	224	291	403	398				656	655	522
1966		43	258	281			465	509	513	640	661	595	477
1967		367	236	222	227	354		50	596	619	597	531	358
1968	402	387	226	203	225	240	422	545	525	552	532	541	429
1969	459	351	324	262	229	303	502	593	599	516	659	644	530
1970	493	418	321	263	248	385	476	618	649	623	681	641	589
1971		398		246	292	375	504	569	568	718		651	542
1972			333	255	316	382	503	620	636	566	602	515	410
1973	438	312	308	276	295	312	399	515	538	613	625	578	481
1974	472	420	322	289	268	406	409	614	566	635	649	592	498
1975		305	262	280									
MEAN	451	372	297	243	264	346	445	522	581	628	638	583	491
					RIVERSIDE CORRECTED								
1954					241	383	368	493	552	601	598	551	501
1955	442	378	291	237	229	348	473	561	540	602	600	547	493
1956	431	342	275	212	218	345	474	447	557	633	601	556	516
1957	434	362	329	277	228	288	429	489	514	605	627	574	485
1958	429	325	285	233	269	297	379	504	553	659	621	527	501
1959	440	384	292	251	280	309	481	514	544	616	622	551	433

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
RIVERSIDE CORRECTED (Contd.)													
1960	453	373	318	233	274	326	422	555	597	631	630	582	491
1961		389	274	271									
1962							404	549	585	599	657	617	510
1963	445	385	283	255	244	329	452	533	529	583	678	588	485
1964		369	293	293									
1968													
1969			287	231	202	268	444	525	531	457	584	570	469
1970	436	370	283	233	219	341	421	547	575	552	603	568	521
1971		353		218	258	332	447	504	503	636		577	480
1972			295	226	279	339	446	549	564				
1973													
MEAN	438	366	292	244	245	325	434	521	550	598	620	567	490
RUTH RESERVOIR													
1967													
1968		347	184			214	391	602	615		666	544	495
1969		306	127	80									
MEAN		327	156	80		214	391	602	615		666	544	495
SALINAS HARTNELL													
1974											590	500	480
1975	374	328	260	189	269	337	405	472	536	492	447	411	345
1976		318	235	175	185	197	272	364	519	545			
1977													
MEAN	370	323	248	182	227	267	339	418	528	519	519	456	413
SALTON SEA													
1967							499	624	703	755	644	596	502
1968	503	449	305	264	311	365	504	633	688	714	637	618	548
1969		427	319	265									
MEAN	502	438	312	265	311	365	502	629	696	735	641	607	525
SAN DIEGO STATE UNIVERSITY													
1974							395	544	502	593	559	529	434
1975	422	297	300	275	298	347	387	468	528	543	598	572	445
1976	494	407	322	261	355	459	581	644	689	652	645	623	289
1977		385	311	262									
MEAN	451	363	311	266	327	403	454	552	573	596	601	575	389

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						SAN FRANCISCO							
1970						301	434	558	565	535	517	452	473
1971	376	298	165	133	216	298	373	483	479	592	521	494	458
1972	382	333	210	143	183	217	370	459	536	620	572	524	417
1973		239	275		167	209	347	546	600	650	562	446	389
1974	341	304	147	142	159	251	260	460	542	548	526	394	363
1975	334	281	203	148	180	221	307	417	526	494	498	372	364
1976		325	245	191	208	230	388	451	566	615	533	464	
1977													
MEAN	370	297	208	151	186	247	354	482	545	579	533	449	411
						SAN FRANCISCO CORRECTED							
1970						302	428	550	557	528	509	446	467
1971	388	301	163	131	224	309	387	502	497	615	542	513	476
1972		346	218	148	198	234							
1973													
MEAN	388	324	191	140	211	282	408	526	527	572	526	480	472
						SAN JOSE							
1970						284	417	528	581	625	644	571	500
1971	397	316	192	153	186	270	365	504	511	611	627	565	467
1972	421	354	228	162	205	259	411	511	589	637	613	603	475
1973	409	308	208	185	184	241	370	572	602	620	616	557	443
1974		329	193	142	181	277	326						
1975												501	384
1976		290	214	167	199	226	364	458	550	570	550	427	
1977													
MEAN	401	319	207	162	191	260	376	515	567	613	610	537	454
						SAN JOSE - CORRECTED							
1970						307	451	572	629	677	697	618	541
1971	422	341	208	166	195	284	384	531	539	665	660	595	492
1972	443	372	241	170	219	272	432	538	621	671	646	635	500
1973	416	324	218	195	192	243	374	579	610	628	623	563	448
1974		333	195	144	183	280	330						
1975												583	447
1976		337	249	194	231	263	423	533	640	663	640	497	
1977													
MEAN	430	341	222	174	204	275	399	551	608	661	653	582	486

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					SAN JOSE STATE UNIVERSITY								
1964					202	351	416	570	630	599	653	587	474
1965		361			175	307							
1966					214	294	355	460	514	576	550	600	647
1967	453	421	319	251	274	376	368	415	592	646	666	602	504
1968		417	227	220								376	416
1969	428	307	199	222	128	183	388	528	663	620	745	621	533
1970	404	251	218	170	142	277	419	528	578	610	627	559	468
1971	374	293	172	138	175	251	342	484	482	600	591	527	428
1972	391	317	202	145	200	230	352	475	595	628	600	537	406
1973	372	245	174	144	154	200	325	543	592	572	573	514	422
1974	352	300	165	139	151	250	282	441	540	558	531	486	385
1975	350	248	185	138	168	211	280	410	556	581	568	494	364
1976		268	192	166									
MEAN	396	312	205	173	180	266	353	485	574	599	610	537	459
					SAN LUIS DAM								
1966											626	589	427
1967	358	280	158	88	131	193	311	377	596	593	634	540	391
1968	389	291	151	143	153	200	349	529	597	643	628	552	435
1969	397	285	160	129	119	189	354	581	627	651	641	582	450
1970	401	287	185	140	143	236	390	537	612	629	622	589	447
1971		269	159	114									
1972					119	202	359	472	575	603	609	571	415
1973	365	249	200	132	132	185	312	496	568	592	611	518	387
1974	350	239	140	95	120	211	292	482	599	585	571	488	380
1975													
MEAN	377	271	165	120	131	202	338	496	596	614	618	554	417
					SAN LUIS OBISPO								
1969										501	578	566	466
1970	456	399	281	240	234	335	479	589	623	583	620	570	514
1971	452	345	281	225	290	351	460	571	559	650	658	572	458
1972	467	388	306	244	302	365	476	594	621	628	628	571	477
1973		323	313	266									
MEAN	454	364	295	244	275	350	472	585	601	591	621	570	479
					SAN RAFAEL								
1970						267	398	513	575	597	600	560	468
1971	384	302	166	124	184	292	352	486	512	606	603	535	440
1972	389	328	206	168	188	226	386	481	559	605	587	532	406
1973	363	222	176	126	124	194	331	490	562	593	597	529	410
1974	354	284	141	117	141	231	245	450	583	585	566	489	414
1975	352	275	197	133	191	205	293	412	562	565	549	460	380
1976		294											
MEAN	373	284	177	134	166	236	334	472	559	592	584	518	420

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SAN RAFAEL - CORRECTED													
1970						297	442	571	641	665	668	624	521
1971	427	336	184	138	204	325	392	541	570	675	671	596	489
1972	438	365	228	187	212	253	435	543	631	684	663	600	459
1973		250	198	141		226	385	569	654	690	694	616	476
1974		329	164	135	166	273	289						
1975													
MEAN	429	320	194	150	194	275	389	556	624	679	674	609	486
SAN VINCENTE													
1957													
1958	484	355	329	277	308	357	394	564	611	735	709	621	553
1959	509	439	346	319	322	383	560	551	623	733	688	605	536
1960		491											
MEAN	499	428	338	298	315	370	477	558	617	734	699	613	545
SANTA MARIA													
1950					267	373	428	601	615	683	679	649	491
1951	488	451	399	250	297	386	530	463	673	628	666	604	513
1952	489	461	322	230	278	359	471	538	665	660	680	622	577
1953	490	361	312	253	287	431	497	491	647	745	710	643	504
1954	493	453	311	301	258	401	446	542	631	721	711	602	542
1955	497	435	302	263	284	390	518	610	599	661	732	639	531
1956	486	416	314	206	218	358	574	554	578	739	660	633	576
1957	487	408	353	283	258	259	482	582	622	671	710	659	553
1958	485	396	322	262	268	270	401	658	652	810	675	564	543
1959	500	413	331	268	279	324	545	565	690	768	694	597	523
1960		451	322	219	239	313	491		710	663	657	624	507
1961	503	424	297	279	295	394	528	640	663	713	696	602	509
1962	489	406	295	257	295	297	445	665	705	666	683	647	503
1963		407	297	247	260		480	580	490				
1964				281	301	403	475	559	620	670	673	572	481
1965	429	353	285	203	256	341	411	470	614	564	617	584	444
1966	425	386	229	217	266	328	436	495	506	635	615	550	437
1967	430	342	219	213	233	376	409	505	645	550	646	573	443
1968	465	423	260	261	250	273	439	579	652	691	645	617	493
1969	447	389	301	234	200	301	505	575	592	538	644	623	463
1970	478	407	280	234	230	344	494	639	652	625	670	628	532
1971	459	358	271	232	280	369	475	555	563	648	645	603	509
1972	454	401	295	226	280	339	469	578	607	617	609	585	446
1973	423	320	274	238	247	282	424	534	536	640	608	552	422
1974	431	365	252	214	205	359	341	575	581	645	622	547	462
1975		305	286	239	272								
1976													
MEAN	469	397	297	244	262	345	469	565	620	665	664	605	500

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					SANTA MARIA - CORRECTED								
1953													
1954	436	400	274	266	228	354	393	479	557	637	628	531	479
1955		384	267	232	251	345	457	539	529	579			
1956								489	510	652	583	559	509
1957		360	311	250	227	228	425	504	549				
1958													
1959							486	505	616	687	620	533	467
1960		402							613	572	567	539	438
1961	434	366	256	241	254	340	455	552	572	615	600	519	439
1962		350	254	221	254	256			608	575	589	558	434
1963		351	256	213									
1964				266	290	388	456	538	596	644	655	557	468
1965	423	343	277	197	253	336	406	463	605	556	616	583	443
1966	431	385	228	216	269	332	441	501	512	644	632	564	449
1967	415	351	224	219	242	363	388	479	613	523	614	543	420
1968	442	401	246	248	237	260	417	550	619	656	612	586	468
1969	424	369	286	221	187	285	479	545	562	511	611	591	439
1970	454	386	265	230	218	326	469	607	619	593	636	596	505
1971	436	340	257	220	266	350	450	527	535	615	612	572	483
1972	441	380	280	215	273	330	456	563	591	601	593	570	435
1973	421	311	267	232	246	281	423	533	535	639	607	551	421
1974	430	364	251	213	204	358	340	574	580	644	621	546	461
1975		304	285	238	271								
1976													
MEAN	433	364	264	230	245	321	434	526	575	608	612	559	456
					SANTA ROSA								
1972												588	421
1973		245											
MEAN		245										588	421
					SHAFTER								
1975										692	702	635	505
1976			262	185	231	295	421	538	678	684			
1977					120	301	408	558	573	595	645	566	516
1978													
MEAN			262	185	176	298	415	548	626	657	674	601	511
					SODA SPRING SNOW LABORATORY								
1975					216	321	426	531	666	704	673	620	512
1976		381	271	207	231	287	449	539	678	698	668		
1977													
MEAN	461	381	271	207	224	304	438	535	672	701	671	620	512

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					SODA SPRINGS SNOW LABORATORY (Contd.)								
1946													
1947	463	358	239	183	245	312	381	560	624	663	779	677	540
1948	450	316	247	195	237	270	392	437	621	692	785	681	531
1949	475	362	264	162	255	296	360	632	563	785	771	686	561
1950	479	404	279	213	178	358	395	619	696	683	773	670	476
1951		321	232	157	194	282	514	574	727				
1952		373	260	185				603	786	726			
1953													
1968					140	304	401	584	612				517
1969		319	170	171	154	234	458	504	519				
1970			234	168	166	316	442	500	600	506	652	583	442
1971		322	141	134	212	302	374	506	503				
1972		281	188	143	196	236	390	534	632	629			
1973				127	169	240	361	608	623	612			
1974													
MEAN	449	340	225	167	195	286	406	555	626	662	752	659	511
					SOLEDAD CTF								
1963								521	595	735	718	609	497
1964	451	372	233	220	227	358	444	595	612	628	669	562	492
1965	425	316	230	150	191	315	489	472	644	629	635	554	470
1966	426	348	221	194	190	376	429	527	570	649	590	562	454
1967	400	363	241	233	237	376	362	467	569	532	580	485	359
1968	375	322	207	188	206	216	365	503	537	573	517	459	409
1969	363	272	190	155	139	199	386	454	517	511	565	539	427
1970	376	334	224	199	163	291	376	494	515	530	502	463	426
1971		291	216	118	155	255	327	454	455				
1972													
MEAN	403	327	220	182	189	298	397	499	557	598	597	529	442
					SPRING VALLEY								
1976													
1977		403	318	308				562	560	677	546	604	318
MEAN		403	318	308				562	560	677	546	604	318
					STOCKTON 9S								
1960													
1961	462	389	221	173	128	316	433	601	667	733	719	611	555
1962		392	229										
MEAN	463	391	225	173	128	316	433	601	667	733	719	611	555

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						THORNTON 2S							
1963											663	541	438
1964	408	341	173	108	152	324	392	566	615	598	682	528	432
1965	407	289	177	148	220	308	367	388	557	682	671	600	477
1966	463	348	234	156	244	306	441	643	651	675	690	635	530
1967	440	385	209	127	181	264	381	446	697	672	731	642	550
1968	443	475	316	246	190	286	379	504	598	642	698	515	462
1969		397	220	191									
MEAN	431	373	222	163	197	298	392	509	624	654	686	577	482
						TRANQUILLITY							
1976									661	683	686	580	481
1977		378	249	120	109	295	431	576	566				
1978													
MEAN	434	378	249	120	109	295	431	576	614	683	686	580	481
						UPPER LAKE 1SE							
1970													
1971				152	228	371	407	571	594	705	738	676	559
1972		418	256	192	218	250	433	569	656		711	629	
1973													
MEAN	470	418	256	172	223	311	420	570	625	705	725	653	559
						VACAVILLE							
1976									645	674	652	535	445
1977		368	224				344	514	470	648	694	585	455
1978		377	263	153									
MEAN		373	244	153			344	514	558	661	673	560	450
						VALLEJO							
1972								591	592	633	612	551	441
1973	409	276	215	162	180	223	396	589	640	654	617	530	427
1974	387	344	178	148	168	267	294	518	622	597	595	526	392
1975		277	236	173	209								
1976													
MEAN	402	299	210	161	186	245	345	566	618	628	608	536	420
						VALLEJO - CORRECTED							
1972								576	577	617	596	536	429
1973		268	209	157		217	385	574	623	637	601	517	416
1974		335	173	143	163	260	286						
1975													
MEAN	394	302	191	150	163	239	336	575	600	627	599	527	423

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
						VICTORVILLE							
1976					311	351	498	606	685	729	649	652	457
1977		417	319	274									
MEAN	496	417	319	274	311	351	498	606	685	729	649	652	457
						VICTORVILLE DIRECT							
1976					613	500	620	674	760	885	704	846	503
1977		579	601	558									
MEAN	654	579	601	558	613	500	620	674	760	885	704	846	503
						WALNUT							
1976					283	272	428	476	500	631	554	575	323
1977	411	355	287	253									
MEAN	411	355	287	253	283	272	428	476	500	631	554	575	323
						WARM SPRINGS DAM							
1973										519	501	449	353
1974	301	262	131	108	136	211	218	374	491	480	461	405	331
1975	300	240	180	136	168	160	237	325	459	486	466	410	332
1976		243	177	142									
MEAN	305	248	163	129	152	186	228	350	475	495	476	421	339
						WASCO 8SW							
1975					202	275	376	491	615	635	600	556	451
1976	421	349	265	208	231	280	421	516	623	634	604	535	385
1977		339	206	203									
MEAN	417	344	236	206	217	278	399	504	619	635	602	546	418
						WILLOWS 6S							
1958								592	744	735	731	662	553
1959		402											
1967						294	351		678				
1968													
MEAN		402				294	351	592	711	735	731	662	553
						YUCCA VALLEY							
1976					319	354	496	607	687	735	626	661	450
1977		422	335	284									
MEAN	498	422	335	284	319	354	496	607	687	735	626	661	450

TABLE 3 (Contd.)

AVERAGE DAILY SOLAR RADIATION (BY MONTHS)
AT MEASURING STATIONS IN CALIFORNIA AND ADJACENT STATES
(in langleys per day)

Year	Ann	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
					YUCCA VALLEY, DIRECT								
1976					612	502	632	704	792	911	788	892	506
1977		653	637	552									
MEAN	682	653	637	552	612	502	632	704	792	911	788	892	506
					YUMA								
1952					266	422	562		759	802	732	666	582
1953	561	487	360	305	349	457	562	673	750	754	732	680	617
1954	558	487	377	343	334	458	521	693	744	774	678	686	600
1955	574	481	407	303	326	468	607	691	776	807	734	654	637
1956	574	510	383	302	311	469	607	691	775	766	724	732	621
1957	543	514	413	347	301	419	535	693	748	789	724	695	532
1958			305	311		405	508	666	775	766	704	636	556
1959	525	454	340	311	343	396	559	642	720	730	630	601	576
1960	517	463	337	252	310	404	548	652	723	730	692	611	485
1961		262	344	308	312	460		689	781	794	718	658	623
1962	554	490	335	282	344	389	560	692	777	813	719	680	568
1963	517	491	348	291	319	433	558	568	662	762	690	612	472
1964	519	420	341	311	327	427	483	650	699	743	667	614	541
1965	511	426	332	269	299	409	501	609	723	740	619	633	574
1966	507	474	287	250	301	389	488	626	714	733	648	641	531
1967	505	451	354	286	317	420	472	606	678	744	639	587	511
1968	490	448	324	252	291	354	444	613	687	702	627	588	550
1969	486	433	319	266	255	351	520	621	674	710	606	588	490
1970	473	426	296	259	271	388	485	593	669	665	581	546	501
1971	481	409	307	244	295	384	499	599	654	677	629	550	519
1972	495	418	317	248	301	401	517	619	681	674	651	595	523
1973	493	346	331	272	304	344	466	623	686	687	666	616	570
1974	503	455	325	292	292	421	504	647	709	710	590	604	487
1975	482	386	309	237	314	404	475	575	661	687	629	604	501
1976	473	414	323	252	294	336	412	610	635	697	611	625	462
1977		416	327	268									
MEAN	518	440	338	282	307	408	516	639	714	738	666	620	545

TABLE 4

AVERAGE MONTHLY EXTRATERRESTRIAL RADIATION (ETR)
ON A HORIZONTAL SURFACE
(in langleys per day)

Month	Degrees of Latitude									
	33	34	35	36	37	38	39	40	41	42
Jan	463	448	434	420	405	391	376	362	347	333
Feb	578	565	552	540	526	513	500	487	473	459
Mar	725	716	707	697	687	677	667	656	646	634
Apr	890	855	850	845	840	834	828	822	816	809
May	946	946	945	944	943	942	940	938	936	934
Jun	978	980	982	983	984	985	986	986	987	987
July	960	961	961	962	962	962	962	961	960	960
Aug	890	888	885	881	878	874	870	866	862	857
Sept	775	767	760	752	744	736	727	719	710	701
Oct	629	618	606	595	583	571	559	547	534	522
Nov	496	482	468	454	440	426	412	398	384	370
Dec	428	414	399	384	370	355	341	326	311	297
Average	730	720	712	705	697	689	681	672	664	655
Standard Deviation	206	210	216	222	227	233	239	244	250	255

Based on a solar constant of 1.940 ly/min

Source: From values computed by Marlo Martin, Energy and Environment Division, Lawrence Berkeley Laboratory, Berkeley, CA 94720.

TABLE 5

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1750	76	159	85	73	76	89	88	90	100	85	103	91	93
1751	66	63	75	70	44	45	56	61	51	66	60	24	57
1752	23	28	44	35	50	71	59	60	40	78	29	27	45
1753	47	38	40	44	32	46	38	36	32	22	39	28	37
1754	25	20	7	0	3	2	14	21	27	19	12	8	13
1755	24	13	4	10	11	7	6	0	0	9	3	18	9
1756	24	7	20	12	7	5	9	12	13	4	6	12	11
1757	14	17	9	14	21	26	30	38	13	25	51	40	25
1758	32	65	34	38	52	49	72	46	45	44	39	62	48
1759	38	43	43	48	44	47	47	49	50	51	71	77	51
1760	60	46	57	67	60	75	58	72	48	66	76	61	62
1761	51	60	61	70	91	81	72	107	99	94	91	101	82
1762	89	90	46	44	73	46	60	40	77	34	68	68	61
1763	69	78	77	56	32	34	33	33	36	54	26	68	50
1764	46	61	61	60	60	40	34	44	30	30	30	28	44
1765	28	26	26	24	26	25	22	20	20	27	30	16	24
1766	14	14	13	12	11	37	6	27	3	3	4	4	13
1767	5	6	19	27	30	43	33	30	33	22	41	43	28
1768	44	55	53	54	66	46	43	78	77	53	67	75	59
1769	78	91	112	74	64	64	97	74	94	119	120	149	95
1770	158	148	112	104	142	80	51	70	83	110	126	104	107
1771	104	132	102	36	46	47	65	153	120	68	58	101	86
1772	90	100	96	101	91	31	92	38	57	77	56	50	73
1773	79	61	64	55	29	51	33	41	28	28	13	29	43
1774	26	41	43	47	65	56	44	51	28	18	7	8	36
1775	14	18	12	4	0	12	11	4	12	1	8	3	8
1776	6	15	8	22	12	6	22	11	19	1	24	16	14
1777	30	35	40	45	36	39	96	80	81	95	112	116	67
1778	106	146	157	177	109	134	145	239	172	153	140	172	154
1779	156	150	105	115	166	118	145	140	114	143	112	111	131
1780	124	114	110	70	98	98	95	107	88	86	86	94	98
1781	77	60	59	99	75	53	68	105	98	74	66	51	74
1782	27	68	35	54	38	37	41	54	38	37	44	34	42
1783	23	32	30	28	39	27	28	23	25	32	20	18	27
1784	8	15	10	13	8	11	10	6	9	6	10	10	10

Source: World Data Center "A" for Solar Terrestrial Physics, Boulder, Colorado 80302

TABLE 5 (Continued)

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1785	8	17	14	6	8	9	16	21	26	36	20	32	18
1786	47	40	27	37	48	48	85	92	59	83	90	112	64
1787	112	116	113	135	106	87	127	135	99	128	137	157	121
1788	157	142	174	138	129	143	108	113	154	142	136	141	140
1789	142	95	130	114	125	120	123	124	120	117	103	112	119
1790	90	134	136	103	128	96	94	93	91	69	87	77	100
1791	84	82	74	73	62	74	77	74	64	71	43	66	70
1791	62	67	66	58	64	63	76	62	61	46	60	59	62
1793	59	57	56	56	55	56	53	52	51	50	29	24	46
1794	47	44	46	45	44	38	28	56	42	41	40	11	39
1795	28	67	51	21	40	13	19	31	17	13	26	14	28
1796	20	25	18	22	24	16	32	21	7	27	2	18	13
1797	11	8	5	14	4	4	4	7	11	44	6	6	7
1798	7	6	3	2	4	12	1	0	0	0	3	2	3
1799	2	12	10	2	13	22	8	8	11	2	0	0	8
1800	5	3	9	7	9	14	0	5	24	21	20	12	11
1801	12	10	40	27	29	30	31	32	31	35	39	34	29
1802	33	40	48	48	47	41	42	44	46	48	50	52	45
1803	38	34	50	50	51	30	25	44	36	48	34	45	40
1804	54	51	48	45	48	48	51	33	35	30	43	53	45
1805	62	61	60	61	44	51	38	39	40	38	43	44	48
1806	29	41	38	39	30	33	28	26	26	30	26	24	31
1807	27	25	24	12	12	10	24	10	12	13	12	6	16
1808	8	3	0	0	4	0	12	14	14	7	8	12	7
1809	5	10	12	7	9	1	2	2	8	0	0	0	5
1810	0	0	0	0	0	0	0	0	0	0	0	0	0
1811	0	0	0	0	0	0	0	0	0	7	0	2	1
1812	6	1	1	11	2	1	0	1	1	0	16	5	4
1813	4	8	10	0	10	2	17	6	11	18	8	15	9
1814	28	17	14	22	12	6	24	6	15	18	2	8	14
1815	19	14	20	19	32	26	32	10	56	36	47	32	29
1816	34	37	65	26	69	74	59	44	44	39	23	48	47
1817	56	38	30	36	58	96	26	21	40	50	45	37	44
1818	26	29	28	35	22	25	34	53	36	28	32	26	31
1819	32	11	26	33	21	4	20	20	35	31	26	15	23
1820	28	25	31	19	27	4	19	29	11	21	26	5	20
1821	9	8	9	22	4	6	9	2	2	2	5	4	7
1822	19	4	0	0	1	16	14	2	6	8	2	0	6
1823	0	0	0	0	1	0	0	0	0	0	0	0	0
1824	0	0	20	22	11	0	19	3	0	0	1	20	8

TABLE 5 (Continued)

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1825	25	0	1	5	16	22	4	16	15	31	26	16	15
1826	16	12	22	18	18	37	24	32	37	52	40	19	29
1827	51	40	68	35	47	58	46	56	56	42	54	50	50
1828	56	48	46	53	64	65	61	89	98	54	76	50	63
1829	55	57	47	43	49	72	95	67	74	91	78	53	65
1830	57	68	56	52	72	85	106	66	65	44	51	62	65
1831	84	81	82	48	50	93	54	38	33	45	55	38	58
1832	46	44	29	31	56	55	27	41	27	14	9	8	32
1833	21	14	28	11	15	12	3	13	1	8	6	12	12
1834	8	6	10	5	18	4	1	9	8	9	4	12	8
1835	25	30	34	8	24	20	62	44	33	60	59	101	42
1836	95	100	78	89	108	98	143	111	125	117	109	95	106
1837	137	121	206	188	176	135	138	112	158	163	134	96	147
1838	124	107	130	145	85	141	127	138	94	108	79	74	113
1839	91	77	80	106	102	78	62	54	55	85	131	133	88
1840	91	69	64	81	88	68	66	69	48	61	58	74	70
1841	55	54	54	24	30	30	40	68	56	31	39	36	43
1842	28	20	39	20	22	22	27	25	20	13	27	18	21
1843	38	40	18	13	4	8	10	21	10	10	12	4	16
1844	5	19	13	9	15	14	21	12	4	21	24	7	14
1845	22	11	22	26	44	43	57	48	31	31	32	30	33
1846	41	39	60	39	51	64	69	60	65	46	55	107	58
1847	56	60	65	63	45	86	45	75	85	52	141	161	78
1848	180	139	110	159	112	109	107	102	129	139	133	100	127
1849	132	115	160	157	132	96	102	81	81	78	68	94	108
1850	72	99	97	78	89	83	44	62	70	39	62	86	73
1851	71	55	61	76	105	65	56	63	63	36	57	68	65
1852	62	51	71	68	66	61	65	55	47	42	40	38	56
1853	67	54	45	41	43	38	48	35	40	46	50	34	45
1854	42	292	23	15	20	21	26	24	21	19	16	22	23
1855	13	28	22	12	11	17	4	9	5	0	3	0	10
1856	10	4	3	0	5	0	6	0	5	5	6	4	4
1857	4	8	7	14	7	5	11	29	16	22	17	42	15
1858	41	31	37	39	35	58	38	41	44	57	55	80	46
1859	91	52	67	84	88	90	86	91	87	95	107	106	87

TABLE 5 (Continued)

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1860	115	97	81	82	88	99	71	107	109	117	100	92	97
1861	90	98	96	62	78	101	98	57	88	78	82	80	84
1862	67	54	80	63	64	44	54	64	84	73	62	67	65
1863	42	51	41	48	57	66	41	54	41	33	48	22	45
1864	40	38	41	58	47	66	36	41	58	55	55	28	47
1865	34	58	29	49	39	40	29	34	34	27	38	22	36
1866	17	25	13	32	38	25	18	13	16	9	13	7	19
1867	14	9	2	0	1	9	5	3	2	5	5	10	5
1868	14	10	25	16	16	26	37	27	31	29	34	47	26
1869	62	59	68	61	60	53	41	104	108	59	80	81	70
1870	59	78	104	77	115	158	160	176	136	132	154	136	124
1871	146	148	130	88	125	143	162	146	92	103	110	80	123
1872	89	105	90	80	120	88	102	108	110	106	93	115	101
1873	103	112	84	87	107	98	76	48	45	67	68	47	90
1874	47	55	49	61	64	46	32	45	38	68	61	28	50
1875	34	29	29	15	22	34	29	12	24	12	15	2	21
1876	13	18	10	14	15	31	2	5	2	15	9	10	12
1877	14	10	8	24	9	12	16	22	14	6	6	17	13
1878	7	14	2	3	7	8	0	6	6	0	0	3	5
1879	1	4	0	1	1	0	6	2	5	8	11	6	4
1880	12	13	7	24	27	19	20	24	34	22	48	66	26
1881	43	31	30	36	53	52	52	44	60	77	58	53	49
1882	64	55	47	45	70	67	96	64	45	45	40	58	58
1883	59	84	42	61	47	43	82	32	76	81	46	53	59
1884	84	84	76	92	87	88	76	66	51	53	56	62	73
1885	48	37	47	43	72	50	55	73	84	66	50	40	55
1886	39	31	22	30	26	57	44	31	27	30	17	21	31
1887	9	0	13	10	13	4	7	20	16	23	21	7	12
1888	7	7	21	13	7	8	5	7	7	3	3	9	8
1889	2	11	7	1	8	7	4	2	6	9	21	6	7
1890	2	0	7	5	1	5	2	5	1	12	9	17	6
1891	11	10	8	14	22	10	20	41	48	59	33	54	28
1892	52	42	32	69	76	50	70	80	76	76	101	63	66
1893	70	65	79	75	73	66	88	85	90	89	129	78	82
1894	80	75	94	83	85	52	82	101	99	106	70	66	83
1895	75	57	60	63	67	61	77	68	72	48	69	58	65
1896	68	47	71	29	57	52	44	28	49	45	27	61	48
1897	29	38	43	41	29	29	31	20	11	28	22	48	31
1898	14	8	33	30	36	38	14	26	22	9	31	35	25
1899	34	31	13	20	9	18	14	8	20	14	3	8	16

TABLE 5 (Continued)

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1900	13	8	10	9	14	9	16	15	12	8	4	8	11
1901	13	4	0	0	2	4	0	10	6	1	1	1	4
1902	4	4	0	6	0	12	0	3	1	1	2	8	3
1903	16	10	1	8	17	14	26	15	16	28	29	11	16
1904	39	44	46	32	24	37	43	40	42	51	58	30	41
1905	54	38	55	55	86	56	39	48	49	73	59	55	56
1906	79	107	56	46	31	64	55	58	63	104	48	56	64
1907	18	39	65	76	108	61	53	43	40	50	54	85	58
1908	65	62	47	39	34	29	58	41	48	40	90	87	53
1909	32	46	40	57	47	66	32	36	23	36	23	39	40
1910	58	56	54	26	32	21	8	22	12	14	12	26	28
1911	38	5	6	3	9	8	16	9	2	4	4	4	9
1912	3	4	2	0	0	5	4	4	4	3	0	10	3
1913	5	1	6	2	3	0	1	0	0	2	0	1	2
1914	3	1	4	3	3	3	17	5	11	5	8	13	6
1915	8	16	22	23	42	39	43	33	69	72	70	50	41
1916	54	42	34	45	55	67	72	74	68	54	35	45	50
1917	51	66	53	75	72	95	75	114	115	120	154	129	93
1918	72	96	129	96	65	72	80	77	59	108	102	80	86
1919	85	83	59	48	80	66	52	88	111	65	69	55	72
1920	53	42	35	51	54	70	15	33	39	28	19	36	40
1921	50	27	30	32	28	27	32	22	34	42	23	18	30
1922	18	18	20	12	26	55	11	8	6	11	6	5	16
1923	6	7	18	4	2	3	6	3	9	4	0	13	6
1924	12	10	3	0	5	2	11	21	24	28	19	25	13
1925	26	22	16	6	23	18	32	43	48	38	38	60	31
1926	69	59	99	72	70	62	38	64	74	52	62	61	65
1927	72	60	79	82	93	70	94	79	59	55	54	68	72
1928	63	67	45	84	74	85	81	77	91	98	84	90	78
1929	61	50	59	69	63	50	53	58	72	70	66	34	59
1930	54	81	108	65	50	35	38	37	29	22	25	32	48
1931	34	36	26	15	43	30	31	25	15	17	13	19	25
1932	10	19	18	12	11	11	11	18	22	10	7	4	13
1933	9	8	11	12	22	10	3	3	5	3	0	5	8
1934	3	1	0	3	8	4	11	20	7	9	8	4	7
1935	6	9	15	19	20	23	12	27	46	34	30	42	24
1936	53	64	62	63	74	77	75	55	70	52	87	76	67
1937	89	115	123	132	128	84	109	117	130	145	138	101	118
1938	125	74	89	98	119	86	101	127	98	165	116	90	107
1939	99	122	93	80	77	65	109	118	101	98	106	113	98

TABLE 5 (Continued)

MEAN MONTHLY ZURICH SUNSPOT NUMBERS, 1749-1977
(water years)

Water Year	Monthly Average												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Mean
1940	88	68	42	50	59	83	61	54	84	68	106	66	69
1941	55	58	68	46	44	46	33	30	60	67	60	66	53
1942	46	38	34	36	53	54	61	25	11	18	20	17	34
1943	19	31	22	12	29	27	26	14	8	13	19	10	19
1944	8	10	19	4	0	11	0	2	5	5	17	14	8
1945	17	11	28	18	13	22	32	31	36	43	26	35	26
1946	69	46	27	48	86	77	76	85	74	116	107	94	75
1947	102	124	122	116	133	130	150	201	164	158	189	169	147
1948	164	128	116	108	86	95	190	174	168	142	158	143	139
1949	136	96	138	119	182	158	147	106	122	126	124	145	133
1950	132	144	118	102	95	110	113	106	84	91	85	51	103
1951	61	55	54	60	60	56	93	108	101	62	61	83	71
1952	52	52	46	41	23	22	29	23	36	39	55	28	37
1953	24	22	34	26	4	10	28	12	22	9	24	19	20
1954	8	2	2	0	0	11	2	1	0	5	8	2	3
1955	7	9	8	23	21	5	11	29	32	27	41	43	21
1956	58	89	77	74	124	118	111	137	117	129	170	173	115
1957	155	201	192	165	130	157	175	165	201	187	158	236	177
1958	254	211	239	202	165	191	196	175	172	191	200	201	200
1959	182	152	188	217	143	186	163	172	169	150	200	145	172
1960	111	124	125	146	106	102	122	120	110	122	134	127	121
1961	83	90	86	58	46	53	61	51	77	70	56	64	66
1962	38	33	40	39	50	46	46	44	42	22	22	51	39
1963	40	27	23	20	24	17	29	43	36	20	33	39	29
1964	35	23	15	15	18	16	9	10	9	3	9	5	14
1965	6	7	15	18	14	12	7	24	16	12	9	17	13
1966	20	16	17	28	24	25	49	45	48	57	51	50	36
1967	57	57	70	111	94	112	70	86	67	92	107	77	83
1968	88	94	126	122	112	92	81	127	110	96	109	117	106
1969	108	86	110	104	120	136	107	120	106	97	98	91	107
1970	96	94	98	112	128	103	110	128	107	112	93	100	107
1971	87	95	84	91	79	61	72	58	50	81	61	50	72
1972	52	63	82	62	88	80	63	80	88	76	77	64	73
1973	61	42	45	43	43	46	58	42	40	23	26	59	44
1974	31	24	23	28	26	21	40	40	36	56	34	40	33
1975	47	25	20	19	12	12	5	9	11	28	40	14	20
1976	9	19	8	8	4	22	19	12	12	2	16	14	12
1977	21	5	15	16	23	8	13	18	38	21	30	44	21
1978	41	27	41										

Table 6

AVERAGE PERCENTAGE OF POSSIBLE SUNSHINE
AT TEN U. S. WEATHER STATIONS[1/]

Station	Yrs of Record	Avg.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Eureka	65	50	42	46	50	55	55	57	52	47	53	49	42	40
Fresno	26	82	50	66	79	85	89	94	96	96	95	88	67	46
Los Angeles Civ Center	32	73	69	72	73	70	66	65	82	83	79	73	74	71
Red Bluff	31	78	53	63	67	79	84	89	96	94	93	80	61	50
Sacramento Airport	27	79	45	61	70	80	86	92	97	96	94	84	64	46
San Diego	35	67	71	72	70	65	58	56	68	69	68	67	73	71
San Francisco	38	67	56	62	69	73	72	73	66	65	72	70	62	53
Reno	33	80	66	68	74	80	81	85	92	93	92	83	70	63
Yuma	25	91	85	88	91	94	96	97	90	91	94	92	86	82
Las Vegas	16	86	78	81	82	84	87	93	86	88	92	86	83	81

1/ Source: National Weather Service

TABLE 7

MAXIMUM POSSIBLE SUNSHINE ON FIRST OF
MONTH BY LATITUDE, UNITS

(hours and minutes)

Latitude, deg. N	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
33	10:02	10:37	10:30	12:33	13:30	14:42	14:19	13:48	12:53	11:52	10:52	10:10
34	9:57	10:34	11:28	12:34	13:33	14:17	14:24	13:51	12:55	11:52	10:50	10:05
35	9:52	10:30	11:27	12:34	13:37	14:22	14:30	13:55	12:57	11:52	10:47	10:00
36	9:47	10:27	11:25	12:36	13:40	14:28	14:36	14:00	12:58	11:51	10:44	9:55
37	9:42	10:23	11:24	12:37	13:43	14:33	14:41	14:07	13:01	11:51	10:41	9:51
38	9:37	10:19	11:22	12:38	13:48	14:39	14:47	14:09	13:02	11:50	10:38	9:46
39	9:31	10:13	11:20	12:40	13:52	14:45	14:53	14:13	13:05	11:50	10:35	9:40
40	9:25	10:11	11:19	12:41	13:55	14:51	15:00	14:18	13:07	11:49	10:31	9:35
41	9:18	10:07	11:17	12:42	13:59	14:57	15:07	14:23	13:09	11:49	10:28	9:29
42	9:13	10:03	11:16	12:43	14:04	15:04	15:13	14:28	13:11	11:48	10:24	9:23

Source: Jerry L. Hatfield, Department of Land, Air, and Water Resources, University of California, Davis, CA 95616

TABLE 8

MEAN SKY COVER (CLOUDINESS), SUNRISE TO SUNSET
AT 23 U. S. WEATHER STATIONS

Station	Yrs of Record	Mean percentage of cloud cover												
		Avg.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bakersfield	30	36	63	57	53	42	30	15	12	11	13	28	48	64
Bishop	23	36	52	48	46	44	41	26	25	21	18	30	40	46
Blue Canyon	26	46	67	64	64	58	49	33	14	18	22	39	59	64
Eureka	33	69	73	74	74	70	69	65	66	68	60	65	73	75
Fresno	26	38	72	60	51	42	31	18	11	12	14	27	51	69
Long Beach	18	46	52	53	53	44	51	48	34	32	39	44	49	49
Los Angeles Civic Center	33	40	45	47	47	47	48	43	27	26	29	38	37	43
Los Angeles Airport	27	47	52	50	51	48	52	52	40	39	41	44	46	47
Mt. Shasta	16	48	69	64	66	56	51	36	15	21	25	43	60	67
Oakland	32	49	62	61	57	50	47	40	35	38	34	43	57	60
Red Bluff	31	45	66	64	62	53	44	31	12	17	20	40	60	69
Sacramento Airport	27	41	71	62	55	46	36	22	10	14	16	33	57	69
Sandberg	27	35	51	52	52	44	35	18	15	14	17	29	42	51
San Diego	35	48	49	50	52	52	57	56	45	41	40	43	41	47
San Francisco Airport	34	47	62	60	56	50	45	38	30	32	31	40	54	61
Santa Maria	33	42	49	49	49	46	45	38	34	34	35	35	41	46
Stockton	28	41	72	65	56	48	35	22	10	13	15	33	57	71
Reno	33	46	62	61	59	55	48	35	21	21	23	40	57	63
Yuma	25	27	41	36	35	23	18	12	27	24	14	21	30	37
Las Vegas	16	33	48	43	42	38	33	18	27	25	16	25	34	42
Medford	35	58	82	76	73	66	60	48	21	22	33	56	74	86
Point Mugu	24	40	41	43	44	42	48	58	51	51	48	44	47	40
San Nicolas Island	23	40	46	45	46	43	52	54	51	46	45	40	42	40

Source: National Weather Service

TABLE 9

MEAN SKY COVER (CLOUDINESS), 24-HOUR PERIOD,
AT 19 U. S. MILITARY STATIONS IN CALIFORNIA[1/]

Station	Years of Record	Mean Percentage of Cloud Cover											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beale AFB[2/]	4	60	60	60	50	40	30	10	20	20	30	60	70
Castle AFB	4	60	50	50	40	30	20	10	10	10	20	40	70
China Lake (NOTS)	3	40	40	30	30	30	10	20	10	10	20	30	30
Edwards AFB	3	40	40	40	30	20	10	20	10	10	20	30	40
El Toro MCAS	5	50	50	50	60	50	50	40	40	40	40	40	40
Fort Ord (U.S. Army)	5	50	60	50	50	60	60	60	60	50	50	50	50
Fresno (WBAS)	3	70	50	40	40	30	10	10	10	10	20	40	60
George AFB	2	40	30	30	30	20	10	20	20	10	20	30	30
Hamilton AFB	4	60	50	50	50	40	30	20	30	20	40	50	60
Imperial Beach (NAS)	5	50	50	50	60	60	70	60	60	50	50	50	50
Lemoore Field (NAS)	4	70	60	40	40	30	20	10	10	10	20	50	70
March AFB	4	40	50	50	50	40	30	20	20	20	30	40	40
Mather AFB	4	60	50	50	50	40	20	10	10	20	30	50	60
McClellan AFB	3	40	40	40	30	30	20	10	10	10	20	40	50
Moffett Field (NAS)	4	60	60	50	50	40	40	30	30	30	40	50	60
Norton AFB	4	50	50	50	50	50	30	20	20	30	30	40	40
Oxnard AFB	4	40	40	50	50	50	50	40	40	40	40	40	40
San Clemente Island (U.S. Navy)	6	50	50	50	50	70	80	80	70	60	50	50	50
Travis AFB	4	60	50	50	40	40	20	10	10	20	30	50	60

1/ Source: U. S. Military Weather Services

2/ Abbreviations:

AFB = Air Force Base
NOTS = Naval Ordinance Test Station
MCAS = Marine Corps Air Station
WBAS = Weather Bureau Air Service
NAS = Naval Air Station

SUNRISE AND SUNSET AT BAKERSFIELD, CALIFORNIA

NO. 1029

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 05	4 54	6 56	5 24	6 26	5 51	5 43	6 18	5 05	6 42	4 42	7 06	4 44	7 15	5 04	7 00	5 28	6 24	5 51	5 40	6 18	5 02	6 47	4 44
2	7 06	4 55	6 55	5 25	6 25	5 52	5 42	6 18	5 04	6 43	4 42	7 06	4 45	7 15	5 05	6 59	5 29	6 22	5 52	5 39	6 19	5 01	6 48	4 43
3	7 06	4 56	6 54	5 26	6 24	5 53	5 40	6 19	5 03	6 44	4 42	7 07	4 45	7 15	5 06	6 58	5 30	6 21	5 52	5 38	6 20	5 00	6 48	4 43
4	7 06	4 57	6 54	5 27	6 22	5 54	5 39	6 20	5 02	6 45	4 41	7 08	4 46	7 15	5 07	6 57	5 30	6 19	5 53	5 36	6 21	4 59	6 49	4 43
5	7 06	4 58	6 53	5 28	6 21	5 55	5 38	6 21	5 01	6 45	4 41	7 08	4 46	7 15	5 07	6 56	5 31	6 18	5 54	5 35	6 21	4 58	6 50	4 43
6	7 06	4 58	6 52	5 29	6 20	5 56	5 36	6 22	5 00	6 46	4 41	7 09	4 47	7 15	5 08	6 55	5 32	6 17	5 55	5 33	6 22	4 57	6 51	4 43
7	7 06	4 59	6 51	5 30	6 18	5 57	5 35	6 22	4 59	6 47	4 41	7 09	4 47	7 14	5 09	6 54	5 33	6 15	5 56	5 32	6 23	4 56	6 52	4 43
8	7 06	5 00	6 50	5 31	6 17	5 58	5 33	6 23	4 58	6 48	4 41	7 10	4 48	7 14	5 10	6 53	5 33	6 14	5 56	5 31	6 24	4 55	6 53	4 43
9	7 06	5 01	6 49	5 32	6 16	5 58	5 32	6 24	4 57	6 49	4 41	7 10	4 49	7 14	5 11	6 52	5 34	6 12	5 57	5 29	6 25	4 54	6 53	4 44
10	7 06	5 02	6 48	5 33	6 14	5 59	5 31	6 25	4 56	6 50	4 40	7 11	4 49	7 14	5 11	6 51	5 35	6 11	5 58	5 28	6 26	4 54	6 54	4 44
11	7 06	5 03	6 47	5 34	6 13	6 00	5 29	6 26	4 55	6 50	4 40	7 11	4 50	7 13	5 12	6 50	5 36	6 09	5 59	5 27	6 27	4 53	6 55	4 44
12	7 06	5 04	6 46	5 35	6 12	6 01	5 28	6 26	4 54	6 51	4 40	7 12	4 50	7 13	5 13	6 49	5 36	6 08	6 00	5 25	6 28	4 52	6 56	4 44
13	7 05	5 05	6 45	5 36	6 10	6 02	5 27	6 27	4 53	6 52	4 40	7 12	4 51	7 12	5 14	6 48	5 37	6 06	6 01	5 24	6 29	4 51	6 56	4 44
14	7 05	5 06	6 44	5 37	6 09	6 03	5 25	6 28	4 53	6 53	4 40	7 12	4 52	7 12	5 14	6 47	5 38	6 05	6 01	5 23	6 30	4 51	6 57	4 45
15	7 05	5 07	6 43	5 38	6 07	6 04	5 24	6 29	4 52	6 54	4 40	7 13	4 52	7 12	5 15	6 45	5 39	6 04	6 02	5 21	6 31	4 50	6 58	4 45
16	7 05	5 08	6 42	5 39	6 06	6 04	5 23	6 30	4 51	6 54	4 41	7 13	4 53	7 11	5 16	6 44	5 39	6 02	6 03	5 20	6 32	4 49	6 58	4 45
17	7 04	5 09	6 41	5 40	6 05	6 05	5 22	6 31	4 50	6 55	4 41	7 13	4 54	7 11	5 17	6 43	5 40	6 01	6 04	5 19	6 33	4 49	6 59	4 46
18	7 04	5 10	6 40	5 41	6 03	6 06	5 20	6 31	4 50	6 56	4 41	7 14	4 54	7 10	5 18	6 42	5 41	5 59	6 05	5 17	6 34	4 48	7 00	4 46
19	7 04	5 11	6 39	5 42	6 02	6 07	5 19	6 32	4 49	6 57	4 41	7 14	4 55	7 10	5 18	6 41	5 42	5 58	6 06	5 16	6 35	4 48	7 00	4 46
20	7 03	5 12	6 37	5 43	6 00	6 08	5 18	6 33	4 48	6 57	4 41	7 14	4 56	7 09	5 19	6 39	5 42	5 56	6 07	5 15	6 36	4 47	7 01	4 47
21	7 03	5 13	6 36	5 44	5 59	6 09	5 16	6 34	4 48	6 58	4 41	7 14	4 56	7 08	5 20	6 38	5 43	5 55	6 07	5 14	6 37	4 47	7 01	4 47
22	7 02	5 14	6 35	5 45	5 57	6 09	5 15	6 35	4 47	6 59	4 41	7 15	4 57	7 08	5 21	6 37	5 44	5 53	6 08	5 13	6 38	4 46	7 02	4 48
23	7 02	5 15	6 34	5 46	5 56	6 10	5 14	6 36	4 46	7 00	4 42	7 15	4 58	7 07	5 21	6 36	5 45	5 52	6 09	5 11	6 39	4 46	7 02	4 48
24	7 01	5 16	6 33	5 47	5 55	6 11	5 13	6 36	4 46	7 00	4 42	7 15	4 58	7 06	5 22	6 34	5 45	5 50	6 10	5 10	6 40	4 45	7 03	4 49
25	7 01	5 17	6 31	5 48	5 53	6 12	5 12	6 37	4 45	7 01	4 42	7 15	4 59	7 06	5 23	6 33	5 46	5 49	6 11	5 09	6 41	4 45	7 03	4 49
26	7 00	5 18	6 30	5 49	5 52	6 13	5 11	6 38	4 45	7 02	4 43	7 15	5 00	7 05	5 24	6 32	5 47	5 48	6 12	5 08	6 42	4 45	7 04	4 50
27	7 00	5 19	6 29	5 50	5 50	6 14	5 09	6 39	4 44	7 02	4 43	7 15	5 01	7 04	5 24	6 30	5 48	5 46	6 13	5 07	6 43	4 44	7 04	4 51
28	6 59	5 20	6 28	5 51	5 49	6 14	5 08	6 40	4 44	7 03	4 43	7 15	5 01	7 03	5 25	6 29	5 48	5 45	6 14	5 06	6 44	4 44	7 04	4 51
29	6 58	5 21	6 27	5 51	5 47	6 15	5 07	6 40	4 43	7 04	4 44	7 15	5 02	7 03	5 26	6 28	5 49	5 43	6 15	5 05	6 45	4 44	7 05	4 52
30	6 58	5 22			5 46	6 16	5 06	6 41	4 43	7 05	4 44	7 15	5 03	7 02	5 27	6 26	5 50	5 42	6 16	5 04	6 46	4 44	7 05	4 53
31	6 57	5 23			5 45	6 17			4 43	7 05			5 04	7 01	5 27	6 25			6 17	5 03			7 05	4 53

Add one hour for Daylight Saving Time if and when in use.

Prepared by
NAUTICAL ALMANAC OFFICE
UNITED STATES NAVAL OBSERVATORY
WASHINGTON, D.C. 20390

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1965

SUNRISE AND SUNSET AT BISHOP, CALIFORNIA

NO. 1030

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 08	4 46	6 57	5 18	6 25	5 47	5 39	6 16	4 59	6 43	4 34	7 08	4 36	7 18	4 57	7 01	5 24	6 23	5 49	5 37	6 18	4 56	6 49	4 36
2	7 08	4 47	6 56	5 19	6 24	5 48	5 38	6 17	4 58	6 44	4 34	7 09	4 37	7 18	4 58	7 00	5 24	6 21	5 50	5 36	6 19	4 55	6 50	4 36
3	7 08	4 48	6 55	5 20	6 22	5 49	5 36	6 18	4 57	6 45	4 34	7 10	4 37	7 18	4 59	6 59	5 25	6 20	5 50	5 34	6 20	4 54	6 51	4 36
4	7 08	4 49	6 54	5 21	6 21	5 50	5 35	6 19	4 55	6 46	4 33	7 10	4 38	7 18	5 00	6 58	5 26	6 18	5 51	5 33	6 21	4 53	6 52	4 36
5	7 08	4 50	6 53	5 22	6 20	5 51	5 34	6 20	4 54	6 46	4 33	7 11	4 38	7 17	5 01	6 57	5 27	6 17	5 52	5 31	6 22	4 52	6 53	4 36
6	7 08	4 51	6 52	5 23	6 18	5 52	5 32	6 20	4 53	6 47	4 33	7 11	4 39	7 17	5 02	6 56	5 28	6 15	5 53	5 30	6 23	4 51	6 53	4 35
7	7 08	4 52	6 52	5 24	6 17	5 53	5 31	6 21	4 52	6 48	4 33	7 12	4 39	7 17	5 03	6 55	5 29	6 14	5 54	5 28	6 24	4 50	6 54	4 35
8	7 08	4 52	6 51	5 25	6 15	5 54	5 29	6 22	4 51	6 49	4 32	7 13	4 40	7 17	5 03	6 54	5 29	6 12	5 55	5 27	6 25	4 49	6 55	4 36
9	7 08	4 53	6 50	5 26	6 14	5 55	5 28	6 23	4 50	6 50	4 32	7 13	4 40	7 16	5 04	6 53	5 30	6 11	5 56	5 25	6 26	4 48	6 56	4 36
10	7 08	4 54	6 48	5 28	6 12	5 56	5 26	6 24	4 49	6 51	4 32	7 14	4 41	7 16	5 05	6 52	5 31	6 09	5 57	5 24	6 27	4 47	6 57	4 36
11	7 08	4 55	6 47	5 29	6 11	5 57	5 25	6 25	4 48	6 52	4 32	7 14	4 42	7 16	5 06	6 51	5 32	6 08	5 58	5 22	6 28	4 46	6 58	4 36
12	7 08	4 56	6 46	5 30	6 09	5 58	5 23	6 26	4 47	6 53	4 32	7 14	4 42	7 15	5 07	6 50	5 33	6 06	5 58	5 21	6 29	4 45	6 58	4 36
13	7 07	4 57	6 45	5 31	6 08	5 59	5 22	6 27	4 46	6 54	4 32	7 15	4 43	7 15	5 08	6 48	5 34	6 05	5 59	5 20	6 31	4 45	6 59	4 36
14	7 07	4 58	6 44	5 32	6 06	6 00	5 21	6 28	4 46	6 54	4 32	7 15	4 44	7 14	5 08	6 47	5 34	6 03	6 00	5 18	6 32	4 44	7 00	4 37
15	7 07	4 59	6 43	5 33	6 05	6 01	5 19	6 28	4 45	6 55	4 32	7 16	4 44	7 14	5 09	6 46	5 35	6 02	6 01	5 17	6 33	4 43	7 00	4 37
16	7 07	5 00	6 42	5 34	6 03	6 01	5 18	6 29	4 44	6 56	4 32	7 16	4 45	7 13	5 10	6 45	5 36	6 00	6 02	5 15	6 34	4 43	7 01	4 37
17	7 06	5 01	6 41	5 35	6 02	6 02	5 16	6 30	4 43	6 57	4 32	7 16	4 46	7 13	5 11	6 43	5 37	5 58	6 03	5 14	6 35	4 42	7 02	4 37
18	7 06	5 02	6 39	5 36	6 00	6 03	5 15	6 31	4 42	6 58	4 32	7 17	4 46	7 12	5 12	6 42	5 38	5 57	6 04	5 13	6 36	4 41	7 02	4 38
19	7 05	5 04	6 38	5 37	5 59	6 04	5 14	6 32	4 42	6 59	4 32	7 17	4 47	7 12	5 13	6 41	5 38	5 55	6 05	5 11	6 37	4 41	7 03	4 38
20	7 05	5 05	6 37	5 38	5 57	6 05	5 12	6 33	4 41	6 59	4 33	7 17	4 48	7 11	5 14	6 39	5 39	5 54	6 06	5 10	6 38	4 40	7 03	4 39
21	7 04	5 06	6 36	5 39	5 56	6 06	5 11	6 34	4 40	7 00	4 33	7 17	4 49	7 10	5 14	6 38	5 40	5 52	6 07	5 09	6 39	4 40	7 04	4 39
22	7 04	5 07	6 34	5 40	5 54	6 07	5 10	6 35	4 39	7 01	4 33	7 18	4 49	7 10	5 15	6 37	5 41	5 51	6 08	5 08	6 40	4 39	7 05	4 40
23	7 03	5 08	6 33	5 41	5 53	6 08	5 09	6 36	4 39	7 02	4 33	7 18	4 50	7 09	5 16	6 35	5 42	5 49	6 09	5 06	6 41	4 39	7 05	4 40
24	7 03	5 09	6 32	5 42	5 51	6 09	5 07	6 37	4 38	7 03	4 34	7 18	4 51	7 08	5 17	6 34	5 43	5 48	6 10	5 05	6 42	4 38	7 05	4 41
25	7 02	5 10	6 30	5 43	5 50	6 10	5 06	6 37	4 38	7 03	4 34	7 18	4 52	7 08	5 18	6 33	5 44	5 46	6 11	5 04	6 43	4 38	7 06	4 41
26	7 01	5 11	6 29	5 44	5 48	6 11	5 05	6 38	4 37	7 04	4 34	7 18	4 53	7 07	5 19	6 31	5 44	5 45	6 12	5 03	6 44	4 37	7 06	4 42
27	7 01	5 12	6 28	5 45	5 47	6 11	5 03	6 39	4 37	7 05	4 35	7 18	4 53	7 06	5 19	6 30	5 45	5 43	6 13	5 01	6 45	4 37	7 07	4 43
28	7 00	5 13	6 26	5 46	5 45	6 12	5 02	6 40	4 36	7 06	4 35	7 18	4 54	7 05	5 20	6 28	5 46	5 42	6 14	5 00	6 46	4 37	7 07	4 43
29	6 59	5 14	6 26	5 47	5 44	6 13	5 01	6 41	4 36	7 06	4 35	7 18	4 55	7 04	5 21	6 27	5 47	5 40	6 15	4 59	6 47	4 36	7 07	4 44
30	6 59	5 15			5 42	6 14	5 00	6 42	4 35	7 07	4 36	7 18	4 56	7 03	5 22	6 26	5 48	5 39	6 16	4 58	6 48	4 36	7 07	4 45
31	6 58	5 17			5 41	6 15			4 35	7 08			4 57	7 02	5 23	6 24			6 17	4 57			7 08	4 45

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT BLUE CANYON, CALIFORNIA

NO. 1031

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 23	4 50	7 10	5 23	6 36	5 55	5 48	6 26	5 05	6 56	4 38	7 23	4 40	7 33	5 02	7 15	5 31	6 34	5 59	5 46	6 30	5 02	7 03	4 40
2	7 23	4 51	7 09	5 24	6 35	5 56	5 46	6 27	5 03	6 57	4 38	7 24	4 40	7 33	5 03	7 14	5 32	6 32	6 00	5 44	6 32	5 01	7 04	4 40
3	7 23	4 52	7 08	5 26	6 33	5 57	5 45	6 28	5 02	6 58	4 37	7 25	4 41	7 33	5 04	7 13	5 33	6 31	6 00	5 43	6 33	5 00	7 05	4 40
4	7 23	4 53	7 07	5 27	6 32	5 58	5 43	6 29	5 01	6 59	4 37	7 25	4 41	7 33	5 05	7 12	5 34	6 29	6 01	5 41	6 34	4 59	7 06	4 40
5	7 23	4 54	7 06	5 28	6 30	5 59	5 41	6 30	5 00	7 00	4 37	7 26	4 42	7 33	5 06	7 11	5 35	6 28	6 02	5 39	6 35	4 58	7 07	4 40
6	7 23	4 55	7 05	5 29	6 29	6 00	5 40	6 31	4 59	7 01	4 37	7 26	4 42	7 32	5 07	7 10	5 36	6 26	6 03	5 38	6 36	4 56	7 08	4 40
7	7 23	4 56	7 04	5 30	6 27	6 01	5 38	6 32	4 58	7 02	4 36	7 27	4 43	7 32	5 08	7 08	5 36	6 24	6 04	5 36	6 37	4 55	7 09	4 39
8	7 23	4 57	7 03	5 31	6 26	6 02	5 37	6 33	4 56	7 03	4 36	7 28	4 44	7 32	5 09	7 07	5 37	6 23	6 05	5 35	6 38	4 54	7 10	4 40
9	7 23	4 58	7 02	5 33	6 24	6 03	5 35	6 34	4 55	7 04	4 36	7 28	4 44	7 31	5 10	7 06	5 38	6 21	6 06	5 33	6 39	4 54	7 11	4 40
10	7 22	4 59	7 01	5 34	6 22	6 04	5 34	6 35	4 54	7 05	4 36	7 29	4 45	7 31	5 11	7 05	5 39	6 20	6 07	5 32	6 40	4 53	7 11	4 40
11	7 22	5 00	7 00	5 35	6 21	6 06	5 32	6 36	4 53	7 05	4 36	7 29	4 45	7 31	5 12	7 04	5 40	6 18	6 08	5 30	6 42	4 52	7 12	4 40
12	7 22	5 01	6 59	5 36	6 19	6 07	5 31	6 37	4 52	7 06	4 36	7 30	4 46	7 30	5 13	7 02	5 41	6 16	6 09	5 29	6 43	4 51	7 13	4 40
13	7 22	5 02	6 57	5 37	6 18	6 08	5 29	6 38	4 51	7 07	4 36	7 30	4 47	7 30	5 13	7 01	5 42	6 15	6 10	5 27	6 44	4 50	7 14	4 40
14	7 21	5 03	6 56	5 38	6 16	6 09	5 28	6 39	4 50	7 08	4 36	7 30	4 48	7 29	5 14	7 00	5 43	6 13	6 11	5 26	6 45	4 49	7 15	4 40
15	7 21	5 04	6 55	5 40	6 15	6 10	5 26	6 40	4 50	7 09	4 36	7 31	4 48	7 29	5 15	6 58	5 44	6 12	6 12	5 24	6 46	4 48	7 15	4 41
16	7 21	5 05	6 54	5 41	6 13	6 11	5 25	6 41	4 49	7 10	4 36	7 31	4 49	7 28	5 16	6 57	5 45	6 10	6 13	5 23	6 47	4 48	7 16	4 41
17	7 20	5 06	6 52	5 42	6 11	6 12	5 23	6 42	4 48	7 11	4 36	7 32	4 50	7 27	5 17	6 56	5 46	6 08	6 14	5 21	6 48	4 47	7 17	4 41
18	7 20	5 07	6 51	5 43	6 10	6 13	5 22	6 43	4 47	7 12	4 36	7 32	4 51	7 27	5 18	6 54	5 46	6 07	6 15	5 20	6 49	4 46	7 17	4 42
19	7 19	5 08	6 50	5 44	6 08	6 14	5 20	6 44	4 46	7 13	4 36	7 32	4 51	7 26	5 19	6 53	5 47	6 05	6 16	5 19	6 51	4 45	7 18	4 42
20	7 19	5 09	6 49	5 45	6 07	6 15	5 19	6 45	4 45	7 14	4 36	7 32	4 52	7 25	5 20	6 52	5 48	6 04	6 17	5 17	6 52	4 45	7 18	4 42
21	7 18	5 10	6 47	5 46	6 05	6 16	5 18	6 46	4 45	7 15	4 36	7 33	4 53	7 25	5 21	6 50	5 49	6 02	6 19	5 16	6 53	4 44	7 19	4 43
22	7 18	5 12	6 46	5 47	6 04	6 17	5 16	6 47	4 44	7 15	4 36	7 33	4 54	7 24	5 22	6 49	5 50	6 00	6 20	5 14	6 54	4 44	7 19	4 43
23	7 17	5 13	6 44	5 49	6 02	6 18	5 15	6 48	4 43	7 16	4 37	7 33	4 55	7 23	5 23	6 47	5 51	5 59	6 21	5 13	6 55	4 43	7 20	4 44
24	7 16	5 14	6 43	5 50	6 00	6 19	5 14	6 49	4 42	7 17	4 37	7 33	4 55	7 22	5 24	6 46	5 52	5 57	6 22	5 12	6 56	4 43	7 20	4 45
25	7 16	5 15	6 42	5 51	5 59	6 20	5 12	6 50	4 42	7 18	4 37	7 33	4 56	7 22	5 25	6 44	5 53	5 55	6 23	5 11	6 57	4 42	7 21	4 45
26	7 15	5 16	6 40	5 52	5 57	6 21	5 11	6 51	4 41	7 19	4 38	7 33	4 57	7 21	5 25	6 43	5 54	5 54	6 24	5 09	6 58	4 42	7 21	4 46
27	7 14	5 17	6 39	5 53	5 56	6 22	5 10	6 52	4 41	7 19	4 38	7 33	4 58	7 20	5 26	6 42	5 55	5 52	6 25	5 08	6 59	4 41	7 21	4 46
28	7 14	5 19	6 37	5 54	5 54	6 22	5 08	6 53	4 40	7 20	4 38	7 33	4 59	7 19	5 27	6 40	5 56	5 51	6 26	5 07	7 00	4 41	7 22	4 47
29	7 13	5 20	6 37	5 55	5 52	6 23	5 07	6 54	4 40	7 21	4 39	7 33	5 00	7 18	5 28	6 38	5 57	5 49	6 27	5 05	7 01	4 41	7 22	4 48
30	7 12	5 21			5 51	6 24	5 06	6 55	4 39	7 22	4 39	7 33	5 01	7 17	5 29	6 37	5 58	5 47	6 28	5 04	7 02	4 40	7 22	4 49
31	7 11	5 22			5 49	6 25			4 39	7 22			5 02	7 16	5 30	6 35			6 29	5 03			7 22	4 49

Add one hour for Daylight Saving Time if and when in use.

TABLE 10 (Contd.)

SUNRISE AND SUNSET AT BURBANK, CALIFORNIA

NO. 1032

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 00	4 55	6 51	5 24	6 23	5 50	5 41	6 14	5 04	6 37	4 43	7 00	4 45	7 09	5 04	6 55	5 27	6 20	5 48	5 38	6 13	5 01	6 41	4 44
2	7 00	4 56	6 50	5 25	6 21	5 50	5 40	6 15	5 03	6 38	4 42	7 00	4 46	7 09	5 05	6 54	5 27	6 18	5 48	5 37	6 14	5 00	6 42	4 44
3	7 00	4 56	6 50	5 26	6 20	5 51	5 38	6 16	5 02	6 39	4 42	7 01	4 46	7 09	5 06	6 53	5 28	6 17	5 49	5 35	6 15	4 59	6 43	4 44
4	7 00	4 57	6 49	5 26	6 19	5 52	5 37	6 16	5 01	6 40	4 42	7 02	4 46	7 09	5 06	6 52	5 29	6 16	5 50	5 34	6 16	4 58	6 44	4 44
5	7 00	4 58	6 48	5 27	6 18	5 53	5 36	6 17	5 00	6 40	4 42	7 02	4 47	7 09	5 07	6 51	5 29	6 14	5 51	5 33	6 17	4 57	6 44	4 44
6	7 00	4 59	6 47	5 28	6 16	5 54	5 34	6 18	4 59	6 41	4 42	7 03	4 47	7 09	5 08	6 50	5 30	6 13	5 51	5 31	6 18	4 56	6 45	4 44
7	7 00	5 00	6 46	5 29	6 15	5 55	5 33	6 19	4 58	6 42	4 41	7 03	4 48	7 08	5 09	6 49	5 31	6 12	5 52	5 30	6 19	4 55	6 46	4 44
8	7 00	5 00	6 45	5 30	6 14	5 55	5 32	6 20	4 57	6 43	4 41	7 04	4 48	7 08	5 09	6 48	5 31	6 10	5 53	5 29	6 20	4 55	6 47	4 44
9	7 00	5 01	6 45	5 31	6 12	5 56	5 30	6 20	4 57	6 44	4 41	7 04	4 49	7 08	5 10	6 47	5 32	6 09	5 54	5 27	6 21	4 54	6 48	4 44
10	7 00	5 02	6 44	5 32	6 11	5 57	5 29	6 21	4 56	6 44	4 41	7 05	4 50	7 08	5 11	6 46	5 33	6 07	5 55	5 26	6 21	4 53	6 48	4 44
11	7 00	5 03	6 43	5 33	6 10	5 58	5 28	6 22	4 55	6 45	4 41	7 05	4 50	7 07	5 11	6 45	5 34	6 06	5 55	5 25	6 22	4 52	6 49	4 44
12	7 00	5 04	6 42	5 34	6 08	5 59	5 27	6 23	4 54	6 46	4 41	7 06	4 51	7 07	5 12	6 44	5 34	6 05	5 56	5 23	6 23	4 52	6 50	4 44
13	7 00	5 05	6 41	5 35	6 07	5 59	5 25	6 23	4 53	6 47	4 41	7 06	4 51	7 07	5 13	6 43	5 35	6 03	5 57	5 22	6 24	4 51	6 51	4 45
14	7 00	5 06	6 40	5 36	6 06	6 00	5 24	6 24	4 52	6 47	4 41	7 06	4 52	7 06	5 14	6 42	5 36	6 02	5 58	5 21	6 25	4 50	6 51	4 45
15	6 59	5 07	6 39	5 37	6 04	6 01	5 23	6 25	4 52	6 48	4 41	7 07	4 53	7 06	5 14	6 41	5 36	6 00	5 59	5 20	6 26	4 50	6 52	4 45
16	6 59	5 08	6 38	5 38	6 03	6 02	5 21	6 26	4 51	6 49	4 41	7 07	4 53	7 05	5 15	6 40	5 37	5 59	5 59	5 18	6 27	4 49	6 53	4 46
17	6 59	5 09	6 37	5 39	6 02	6 03	5 20	6 26	4 50	6 50	4 41	7 07	4 54	7 05	5 16	6 39	5 38	5 58	6 00	5 17	6 28	4 49	6 53	4 46
18	6 59	5 10	6 36	5 40	6 00	6 03	5 19	6 27	4 50	6 50	4 41	7 08	4 54	7 04	5 17	6 37	5 38	5 56	6 01	5 16	6 29	4 48	6 54	4 46
19	6 58	5 11	6 34	5 41	5 59	6 04	5 18	6 28	4 49	6 51	4 42	7 08	4 55	7 04	5 17	6 36	5 39	5 55	6 02	5 15	6 30	4 47	6 54	4 47
20	6 58	5 12	6 33	5 42	5 58	6 05	5 17	6 29	4 48	6 52	4 42	7 08	4 56	7 03	5 18	6 35	5 40	5 53	6 03	5 14	6 31	4 47	6 55	4 47
21	6 57	5 13	6 32	5 43	5 56	6 06	5 15	6 30	4 48	6 53	4 42	7 08	4 56	7 03	5 19	6 34	5 41	5 52	6 03	5 12	6 32	4 47	6 55	4 48
22	6 57	5 14	6 31	5 43	5 55	6 07	5 14	6 30	4 47	6 53	4 42	7 09	4 57	7 02	5 19	6 33	5 41	5 51	6 04	5 11	6 33	4 46	6 56	4 48
23	6 57	5 15	6 30	5 44	5 53	6 07	5 13	6 31	4 47	6 54	4 42	7 09	4 58	7 02	5 20	6 31	5 42	5 49	6 05	5 10	6 34	4 46	6 56	4 49
24	6 56	5 16	6 29	5 45	5 52	6 08	5 12	6 32	4 46	6 55	4 43	7 09	4 58	7 01	5 21	6 30	5 43	5 48	6 06	5 09	6 35	4 45	6 57	4 49
25	6 55	5 17	6 28	5 46	5 51	6 09	5 11	6 33	4 46	6 55	4 43	7 09	4 59	7 00	5 22	6 29	5 43	5 46	6 07	5 08	6 36	4 45	6 57	4 50
26	6 55	5 18	6 26	5 47	5 49	6 10	5 10	6 33	4 45	6 56	4 43	7 09	5 00	7 00	5 22	6 28	5 44	5 45	6 08	5 07	6 37	4 45	6 58	4 51
27	6 54	5 19	6 25	5 48	5 48	6 10	5 08	6 34	4 45	6 57	4 44	7 09	5 01	6 59	5 23	6 26	5 45	5 44	6 09	5 06	6 37	4 45	6 58	4 51
28	6 54	5 20	6 24	5 49	5 47	6 11	5 07	6 35	4 44	6 57	4 44	7 09	5 01	6 58	5 24	6 25	5 46	5 42	6 10	5 05	6 38	4 44	6 58	4 52
29	6 53	5 21	6 24	5 50	5 45	6 12	5 06	6 36	4 44	6 58	4 44	7 09	5 02	6 57	5 24	6 24	5 46	5 41	6 10	5 04	6 39	4 44	6 59	4 52
30	6 52	5 22			5 44	6 13	5 05	6 37	4 43	6 59	4 45	7 09	5 03	6 56	5 25	6 22	5 47	5 39	6 11	5 03	6 40	4 44	6 59	4 53
31	6 52	5 23			5 42	6 13			4 43	6 59			5 03	6 56	5 26	6 21			6 12	5 02			6 59	4 54

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT EUREKA, CALIFORNIA

NO. 1033

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 41	5 00	7 27	5 34	6 51	6 08	6 01	6 41	5 15	7 13	4 47	7 42	4 49	7 52	5 13	7 32	5 43	6 49	6 13	5 59	6 47	5 13	7 21	4 50
2	7 41	5 01	7 26	5 35	6 50	6 09	5 59	6 42	5 14	7 14	4 47	7 42	4 49	7 52	5 14	7 31	5 44	6 48	6 14	5 57	6 48	5 12	7 22	4 50
3	7 41	5 01	7 25	5 36	6 48	6 10	5 57	6 43	5 13	7 15	4 47	7 43	4 50	7 52	5 15	7 30	5 45	6 46	6 15	5 56	6 49	5 11	7 23	4 49
4	7 41	5 02	7 24	5 38	6 46	6 11	5 56	6 44	5 12	7 16	4 46	7 44	4 50	7 51	5 16	7 29	5 46	6 44	6 16	5 54	6 50	5 10	7 24	4 49
5	7 41	5 03	7 23	5 39	6 45	6 12	5 54	6 45	5 10	7 17	4 46	7 44	4 51	7 51	5 17	7 28	5 47	6 43	6 17	5 53	6 52	5 08	7 25	4 49
6	7 41	5 04	7 22	5 40	6 43	6 13	5 52	6 46	5 09	7 18	4 46	7 45	4 51	7 51	5 18	7 27	5 48	6 41	6 18	5 51	6 53	5 07	7 26	4 49
7	7 41	5 05	7 21	5 41	6 42	6 14	5 51	6 48	5 08	7 19	4 45	7 46	4 52	7 51	5 19	7 26	5 49	6 40	6 19	5 49	6 54	5 06	7 27	4 49
8	7 41	5 06	7 20	5 43	6 40	6 16	5 49	6 49	5 07	7 20	4 45	7 46	4 53	7 50	5 20	7 24	5 50	6 38	6 20	5 48	6 55	5 05	7 28	4 49
9	7 41	5 07	7 19	5 44	6 39	6 17	5 48	6 50	5 06	7 21	4 45	7 47	4 53	7 50	5 20	7 23	5 51	6 36	6 21	5 46	6 56	5 04	7 29	4 49
10	7 41	5 08	7 17	5 45	6 37	6 18	5 46	6 51	5 05	7 22	4 45	7 47	4 54	7 49	5 21	7 22	5 52	6 35	6 22	5 44	6 58	5 03	7 30	4 49
11	7 40	5 09	7 16	5 46	6 35	6 19	5 44	6 52	5 04	7 23	4 45	7 48	4 55	7 49	5 22	7 20	5 53	6 33	6 23	5 43	6 59	5 02	7 31	4 49
12	7 40	5 10	7 15	5 48	6 34	6 20	5 43	6 53	5 03	7 24	4 45	7 48	4 55	7 49	5 23	7 19	5 54	6 31	6 24	5 41	7 00	5 01	7 32	4 49
13	7 40	5 11	7 14	5 49	6 32	6 21	5 41	6 54	5 02	7 25	4 44	7 49	4 56	7 48	5 24	7 18	5 55	6 29	6 25	5 40	7 01	5 00	7 32	4 49
14	7 39	5 12	7 12	5 50	6 30	6 22	5 40	6 55	5 01	7 26	4 44	7 49	4 57	7 47	5 25	7 16	5 56	6 28	6 27	5 38	7 02	5 00	7 33	4 50
15	7 39	5 14	7 11	5 51	6 29	6 23	5 38	6 56	5 00	7 27	4 44	7 50	4 58	7 47	5 26	7 15	5 57	6 26	6 28	5 37	7 03	4 59	7 34	4 50
16	7 39	5 15	7 10	5 52	6 27	6 24	5 37	6 57	4 59	7 28	4 44	7 50	4 59	7 46	5 27	7 14	5 58	6 24	6 29	5 35	7 05	4 58	7 34	4 50
17	7 38	5 16	7 08	5 54	6 25	6 25	5 35	6 58	4 58	7 29	4 45	7 50	4 59	7 46	5 28	7 12	5 59	6 23	6 30	5 34	7 06	4 57	7 35	4 50
18	7 38	5 17	7 07	5 55	6 24	6 26	5 34	6 59	4 57	7 30	4 45	7 51	5 00	7 45	5 29	7 11	6 00	6 21	6 31	5 32	7 07	4 56	7 36	4 51
19	7 37	5 18	7 06	5 56	6 22	6 27	5 32	7 00	4 56	7 31	4 45	7 51	5 01	7 44	5 30	7 09	6 01	6 19	6 32	5 31	7 08	4 56	7 36	4 51
20	7 37	5 19	7 04	5 57	6 21	6 29	5 31	7 01	4 55	7 32	4 45	7 51	5 02	7 44	5 31	7 08	6 02	6 18	6 33	5 29	7 09	4 55	7 37	4 52
21	7 36	5 21	7 03	5 58	6 19	6 30	5 29	7 02	4 54	7 33	4 45	7 52	5 03	7 43	5 32	7 06	6 03	6 16	6 34	5 28	7 10	4 54	7 37	4 52
22	7 35	5 22	7 01	6 00	6 17	6 31	5 28	7 03	4 54	7 33	4 45	7 52	5 04	7 42	5 33	7 05	6 04	6 14	6 35	5 26	7 12	4 54	7 38	4 53
23	7 35	5 23	7 00	6 01	6 16	6 32	5 26	7 04	4 53	7 34	4 46	7 52	5 04	7 41	5 34	7 03	6 05	6 13	6 37	5 25	7 13	4 53	7 38	4 53
24	7 34	5 24	6 59	6 02	6 14	6 33	5 25	7 05	4 52	7 35	4 46	7 52	5 05	7 40	5 35	7 02	6 06	6 11	6 38	5 24	7 14	4 53	7 39	4 54
25	7 33	5 25	6 57	6 03	6 12	6 34	5 23	7 06	4 51	7 36	4 46	7 52	5 06	7 39	5 36	7 00	6 07	6 09	6 39	5 22	7 15	4 52	7 39	4 54
26	7 32	5 27	6 56	6 04	6 11	6 35	5 22	7 07	4 51	7 37	4 47	7 52	5 07	7 39	5 37	6 59	6 08	6 07	6 40	5 21	7 16	4 52	7 40	4 55
27	7 32	5 28	6 54	6 05	6 09	6 36	5 21	7 09	4 50	7 38	4 47	7 52	5 08	7 38	5 38	6 57	6 09	6 06	6 41	5 19	7 17	4 51	7 40	4 56
28	7 31	5 29	6 53	6 07	6 07	6 37	5 19	7 10	4 49	7 39	4 47	7 52	5 09	7 37	5 39	6 56	6 10	6 04	6 42	5 18	7 18	4 51	7 40	4 56
29	7 30	5 30	6 52	6 08	6 06	6 38	5 18	7 11	4 49	7 39	4 48	7 52	5 10	7 36	5 40	6 54	6 11	6 02	6 43	5 17	7 19	4 50	7 41	4 57
30	7 29	5 32			6 04	6 39	5 17	7 12	4 48	7 40	4 48	7 52	5 11	7 35	5 41	6 53	6 12	6 01	6 45	5 16	7 20	4 50	7 41	4 58
31	7 28	5 33			6 02	6 40			4 48	7 41			5 12	7 34	5 42	6 51			6 46	5 14			7 41	4 59

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT FRESNO, CALIFORNIA

NO. 1034

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 12	4 53	7 01	5 24	6 30	5 53	5 45	6 21	5 05	6 47	4 41	7 12	4 43	7 22	5 04	7 05	5 30	6 27	5 54	5 43	6 22	5 02	6 53	4 43
2	7 12	4 54	7 00	5 25	6 29	5 54	5 44	6 22	5 04	6 48	4 41	7 13	4 44	7 22	5 05	7 04	5 30	6 26	5 55	5 41	6 23	5 01	6 54	4 43
3	7 12	4 55	6 59	5 26	6 27	5 55	5 42	6 23	5 03	6 49	4 41	7 13	4 44	7 21	5 06	7 04	5 31	6 25	5 55	5 40	6 24	5 00	6 54	4 43
4	7 12	4 56	6 59	5 27	6 26	5 56	5 41	6 24	5 02	6 50	4 40	7 14	4 45	7 21	5 07	7 03	5 32	6 23	5 56	5 38	6 25	4 59	6 55	4 42
5	7 12	4 57	6 58	5 28	6 24	5 57	5 39	6 24	5 01	6 51	4 40	7 14	4 45	7 21	5 07	7 01	5 33	6 22	5 57	5 37	6 26	4 58	6 56	4 42
6	7 12	4 58	6 57	5 30	6 23	5 58	5 38	6 25	5 00	6 51	4 40	7 15	4 46	7 21	5 08	7 00	5 34	6 20	5 58	5 35	6 27	4 57	6 57	4 42
7	7 12	4 58	6 56	5 31	6 22	5 59	5 36	6 26	4 59	6 52	4 40	7 16	4 46	7 21	5 09	6 59	5 34	6 19	5 59	5 34	6 28	4 56	6 58	4 42
8	7 12	4 59	6 55	5 32	6 20	6 00	5 35	6 27	4 58	6 53	4 40	7 16	4 47	7 20	5 10	6 58	5 35	6 17	6 00	5 32	6 29	4 55	6 59	4 42
9	7 12	5 00	6 54	5 33	6 19	6 01	5 34	6 28	4 57	6 54	4 39	7 17	4 47	7 20	5 11	6 57	5 36	6 16	6 01	5 31	6 30	4 54	7 00	4 43
10	7 12	5 01	6 53	5 34	6 17	6 01	5 32	6 29	4 56	6 55	4 39	7 17	4 48	7 20	5 12	6 56	5 37	6 14	6 02	5 30	6 32	4 54	7 00	4 43
11	7 12	5 02	6 52	5 35	6 16	6 02	5 31	6 30	4 55	6 56	4 39	7 18	4 49	7 19	5 12	6 55	5 38	6 13	6 02	5 28	6 33	4 53	7 01	4 43
12	7 11	5 03	6 51	5 36	6 15	6 03	5 29	6 30	4 54	6 57	4 39	7 18	4 49	7 19	5 13	6 54	5 38	6 11	6 03	5 27	6 34	4 52	7 02	4 43
13	7 11	5 04	6 50	5 37	6 13	6 04	5 28	6 31	4 53	6 58	4 39	7 18	4 50	7 19	5 14	6 53	5 39	6 10	6 04	5 25	6 35	4 51	7 03	4 43
14	7 11	5 05	6 49	5 38	6 12	6 05	5 27	6 32	4 52	6 58	4 39	7 19	4 51	7 18	5 15	6 51	5 40	6 08	6 05	5 24	6 36	4 51	7 03	4 44
15	7 11	5 06	6 47	5 39	6 10	6 06	5 25	6 33	4 51	6 59	4 39	7 19	4 51	7 18	5 16	6 50	5 41	6 07	6 06	5 23	6 37	4 50	7 04	4 44
16	7 10	5 07	6 46	5 40	6 09	6 07	5 24	6 34	4 51	7 00	4 39	7 20	4 52	7 17	5 16	6 49	5 42	6 05	6 07	5 21	6 38	4 49	7 05	4 44
17	7 10	5 08	6 45	5 41	6 07	6 08	5 23	6 35	4 50	7 01	4 39	7 20	4 53	7 17	5 17	6 48	5 42	6 04	6 08	5 20	6 39	4 48	7 05	4 44
18	7 10	5 09	6 44	5 42	6 06	6 09	5 21	6 36	4 49	7 02	4 39	7 20	4 53	7 16	5 18	6 46	5 43	6 02	6 09	5 19	6 40	4 48	7 06	4 45
19	7 09	5 10	6 43	5 43	6 04	6 10	5 20	6 37	4 48	7 02	4 40	7 20	4 54	7 16	5 19	6 45	5 44	6 01	6 10	5 17	6 41	4 47	7 07	4 45
20	7 09	5 11	6 42	5 44	6 03	6 10	5 19	6 37	4 48	7 03	4 40	7 21	4 55	7 15	5 20	6 44	5 45	5 59	6 11	5 16	6 42	4 47	7 07	4 46
21	7 08	5 12	6 40	5 45	6 01	6 11	5 17	6 38	4 47	7 04	4 40	7 21	4 56	7 14	5 21	6 43	5 46	5 58	6 12	5 15	6 43	4 46	7 08	4 46
22	7 08	5 13	6 39	5 46	6 00	6 12	5 16	6 39	4 46	7 05	4 40	7 21	4 56	7 14	5 21	6 41	5 46	5 56	6 13	5 14	6 44	4 46	7 08	4 47
23	7 07	5 14	6 38	5 47	5 58	6 13	5 15	6 40	4 46	7 06	4 40	7 21	4 57	7 13	5 22	6 40	5 47	5 55	6 13	5 12	6 45	4 45	7 09	4 47
24	7 07	5 16	6 37	5 48	5 57	6 14	5 13	6 41	4 45	7 06	4 41	7 21	4 58	7 12	5 23	6 39	5 48	5 53	6 14	5 11	6 46	4 45	7 09	4 48
25	7 06	5 17	6 35	5 49	5 55	6 15	5 12	6 42	4 45	7 07	4 41	7 22	4 59	7 11	5 24	6 37	5 49	5 52	6 15	5 10	6 47	4 44	7 10	4 48
26	7 06	5 18	6 34	5 50	5 54	6 16	5 11	6 43	4 44	7 08	4 41	7 22	4 59	7 11	5 25	6 36	5 50	5 50	6 16	5 09	6 48	4 44	7 10	4 49
27	7 05	5 19	6 33	5 51	5 52	6 17	5 10	6 44	4 43	7 09	4 42	7 22	5 00	7 10	5 25	6 34	5 50	5 49	6 17	5 08	6 49	4 44	7 10	4 50
28	7 04	5 20	6 31	5 52	5 51	6 17	5 09	6 44	4 43	7 09	4 42	7 22	5 01	7 09	5 26	6 33	5 51	5 47	6 18	5 06	6 50	4 44	7 11	4 50
29	7 03	5 21	6 31	5 53	5 50	6 18	5 07	6 45	4 43	7 10	4 42	7 22	5 02	7 08	5 27	6 32	5 52	5 46	6 19	5 05	6 51	4 43	7 11	4 51
30	7 03	5 22			5 48	6 19	5 06	6 46	4 42	7 11	4 43	7 22	5 03	7 07	5 28	6 30	5 53	5 44	6 20	5 04	6 52	4 43	7 11	4 52
31	7 02	5 23			5 47	6 20			4 42	7 11			5 03	7 06	5 29	6 29			6 21	5 03			7 11	4 52

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT LOS ANGELES, CALIFORNIA

NO. 1035

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	6 59	4 55	6 50	5 23	6 22	5 49	5 41	6 14	5 04	6 37	4 43	6 59	4 45	7 08	5 04	6 54	5 26	6 19	5 47	5 38	6 12	5 00	6 40	4 44
2	6 59	4 55	6 50	5 24	6 21	5 50	5 39	6 14	5 03	6 37	4 42	7 00	4 45	7 08	5 05	6 53	5 27	6 18	5 48	5 36	6 13	4 59	6 41	4 44
3	6 59	4 56	6 49	5 25	6 20	5 51	5 38	6 15	5 02	6 38	4 42	7 00	4 46	7 08	5 05	6 52	5 28	6 16	5 49	5 35	6 14	4 59	6 42	4 43
4	6 59	4 57	6 48	5 26	6 18	5 52	5 37	6 16	5 01	6 39	4 42	7 01	4 46	7 08	5 06	6 51	5 28	6 15	5 49	5 33	6 15	4 58	6 43	4 43
5	6 59	4 58	6 47	5 27	6 17	5 52	5 35	6 17	5 00	6 40	4 42	7 01	4 47	7 08	5 07	6 50	5 29	6 14	5 50	5 32	6 16	4 57	6 44	4 43
6	6 59	4 59	6 46	5 28	6 16	5 53	5 34	6 17	4 59	6 40	4 41	7 02	4 47	7 08	5 08	6 49	5 30	6 12	5 51	5 31	6 17	4 56	6 44	4 43
7	6 59	4 59	6 46	5 29	6 14	5 54	5 33	6 18	4 58	6 41	4 41	7 02	4 48	7 07	5 08	6 48	5 30	6 11	5 52	5 29	6 18	4 55	6 45	4 44
8	6 59	5 00	6 45	5 30	6 13	5 55	5 31	6 19	4 57	6 42	4 41	7 03	4 48	7 07	5 09	6 47	5 31	6 10	5 52	5 28	6 19	4 54	6 46	4 44
9	6 59	5 01	6 44	5 31	6 12	5 56	5 30	6 20	4 56	6 43	4 41	7 03	4 49	7 07	5 10	6 46	5 32	6 08	5 53	5 27	6 20	4 54	6 47	4 44
10	6 59	5 02	6 43	5 32	6 11	5 57	5 29	6 20	4 55	6 44	4 41	7 04	4 49	7 07	5 10	6 45	5 32	6 07	5 54	5 25	6 21	4 53	6 48	4 44
11	6 59	5 03	6 42	5 33	6 09	5 57	5 27	6 21	4 55	6 44	4 41	7 04	4 50	7 06	5 11	6 44	5 33	6 05	5 55	5 24	6 22	4 52	6 48	4 44
12	6 59	5 04	6 41	5 34	6 08	5 58	5 26	6 22	4 54	6 45	4 41	7 05	4 51	7 06	5 12	6 43	5 34	6 04	5 55	5 23	6 23	4 51	6 49	4 44
13	6 59	5 05	6 40	5 35	6 07	5 59	5 25	6 23	4 53	6 46	4 41	7 05	4 51	7 06	5 13	6 42	5 35	6 03	5 56	5 22	6 23	4 51	6 50	4 45
14	6 59	5 06	6 39	5 36	6 05	6 00	5 24	6 23	4 52	6 47	4 41	7 05	4 52	7 05	5 13	6 41	5 35	6 01	5 57	5 20	6 24	4 50	6 50	4 45
15	6 58	5 07	6 38	5 37	6 04	6 01	5 22	6 24	4 52	6 47	4 41	7 06	4 52	7 05	5 14	6 40	5 36	6 00	5 58	5 19	6 25	4 49	6 51	4 45
16	6 58	5 08	6 37	5 38	6 02	6 01	5 21	6 25	4 51	6 48	4 41	7 06	4 53	7 04	5 15	6 39	5 37	5 58	5 59	5 18	6 26	4 49	6 52	4 45
17	6 58	5 09	6 36	5 39	6 01	6 02	5 20	6 26	4 50	6 49	4 41	7 06	4 54	7 04	5 16	6 38	5 37	5 57	5 59	5 17	6 27	4 48	6 52	4 46
18	6 58	5 10	6 35	5 39	6 00	6 03	5 19	6 26	4 49	6 50	4 41	7 07	4 54	7 04	5 16	6 37	5 38	5 56	6 00	5 15	6 28	4 48	6 53	4 46
19	6 57	5 10	6 34	5 40	5 58	6 04	5 17	6 27	4 49	6 50	4 41	7 07	4 55	7 03	5 17	6 35	5 39	5 54	6 01	5 14	6 29	4 47	6 53	4 47
20	6 57	5 11	6 33	5 41	5 57	6 04	5 16	6 28	4 48	6 51	4 42	7 07	4 56	7 02	5 18	6 34	5 39	5 53	6 02	5 13	6 30	4 47	6 54	4 47
21	6 57	5 12	6 32	5 42	5 56	6 05	5 15	6 29	4 48	6 52	4 42	7 07	4 56	7 02	5 18	6 33	5 40	5 51	6 03	5 12	6 31	4 46	6 55	4 48
22	6 56	5 13	6 30	5 43	5 54	6 06	5 14	6 30	4 47	6 52	4 42	7 08	4 57	7 01	5 19	6 32	5 41	5 50	6 04	5 11	6 32	4 46	6 55	4 48
23	6 56	5 14	6 29	5 44	5 53	6 07	5 13	6 30	4 46	6 53	4 42	7 08	4 58	7 01	5 20	6 31	5 41	5 49	6 04	5 10	6 33	4 46	6 56	4 49
24	6 55	5 15	6 28	5 45	5 52	6 07	5 12	6 31	4 46	6 54	4 42	7 08	4 58	7 00	5 21	6 29	5 42	5 47	6 05	5 09	6 34	4 45	6 56	4 49
25	6 55	5 16	6 27	5 46	5 50	6 08	5 10	6 32	4 45	6 55	4 43	7 08	4 59	6 59	5 21	6 28	5 43	5 46	6 06	5 07	6 35	4 45	6 56	4 50
26	6 54	5 17	6 26	5 47	5 49	6 09	5 09	6 33	4 45	6 55	4 43	7 08	5 00	6 59	5 22	6 27	5 44	5 44	6 07	5 06	6 36	4 45	6 57	4 50
27	6 54	5 18	6 24	5 47	5 47	6 10	5 08	6 33	4 44	6 56	4 43	7 08	5 00	6 58	5 23	6 26	5 44	5 43	6 08	5 05	6 37	4 44	6 57	4 51
28	6 53	5 19	6 23	5 48	5 46	6 11	5 07	6 34	4 44	6 56	4 44	7 08	5 01	6 57	5 23	6 24	5 45	5 42	6 09	5 04	6 37	4 44	6 58	4 52
29	6 52	5 20	6 23	5 49	5 45	6 11	5 06	6 35	4 44	6 57	4 44	7 08	5 02	6 56	5 24	6 23	5 46	5 40	6 10	5 03	6 38	4 44	6 58	4 52
30	6 52	5 21			5 43	6 12	5 05	6 36	4 43	6 58	4 45	7 08	5 03	6 56	5 25	6 22	5 46	5 39	6 11	5 02	6 39	4 44	6 58	4 53
31	6 51	5 22			5 42	6 13			4 43	6 58			5 03	6 55	5 26	6 20			6 11	5 01			6 58	4 54

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT MT. SHASTA, CALIFORNIA

NO. 1036

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 35	4 51	7 21	5 25	6 44	6 00	5 53	6 34	5 07	7 06	4 38	7 36	4 40	7 46	5 04	7 26	5 35	6 43	6 06	5 52	6 40	5 05	7 16	4 41
2	7 35	4 52	7 20	5 27	6 43	6 01	5 51	6 35	5 06	7 07	4 38	7 37	4 40	7 46	5 05	7 25	5 36	6 41	6 07	5 50	6 42	5 04	7 17	4 41
3	7 35	4 52	7 19	5 28	6 41	6 02	5 50	6 36	5 04	7 08	4 38	7 37	4 41	7 46	5 06	7 24	5 37	6 39	6 08	5 48	6 43	5 02	7 18	4 40
4	7 35	4 53	7 18	5 29	6 39	6 03	5 48	6 37	5 03	7 10	4 37	7 38	4 41	7 46	5 07	7 23	5 38	6 38	6 09	5 47	6 44	5 01	7 19	4 40
5	7 35	4 54	7 17	5 31	6 38	6 04	5 46	6 38	5 02	7 11	4 37	7 39	4 42	7 45	5 08	7 22	5 39	6 36	6 10	5 45	6 45	5 00	7 20	4 40
6	7 35	4 55	7 16	5 32	6 36	6 06	5 45	6 40	5 01	7 12	4 37	7 39	4 42	7 45	5 09	7 21	5 40	6 34	6 11	5 43	6 46	4 59	7 21	4 40
7	7 35	4 56	7 14	5 33	6 35	6 07	5 43	6 41	4 59	7 13	4 36	7 40	4 43	7 45	5 10	7 19	5 41	6 33	6 12	5 42	6 48	4 58	7 21	4 40
8	7 35	4 57	7 13	5 34	6 33	6 08	5 41	6 42	4 58	7 14	4 36	7 41	4 44	7 45	5 11	7 18	5 42	6 31	6 13	5 40	6 49	4 57	7 22	4 40
9	7 35	4 58	7 12	5 36	6 31	6 09	5 40	6 43	4 57	7 15	4 36	7 41	4 44	7 44	5 12	7 17	5 43	6 29	6 14	5 38	6 50	4 56	7 23	4 40
10	7 35	4 59	7 11	5 37	6 30	6 10	5 38	6 44	4 56	7 16	4 36	7 42	4 45	7 44	5 13	7 15	5 44	6 27	6 15	5 37	6 51	4 55	7 24	4 40
11	7 34	5 00	7 10	5 38	6 28	6 11	5 36	6 45	4 55	7 17	4 36	7 42	4 46	7 43	5 14	7 14	5 45	6 26	6 16	5 35	6 52	4 54	7 25	4 40
12	7 34	5 01	7 08	5 39	6 26	6 12	5 35	6 46	4 54	7 18	4 35	7 43	4 46	7 43	5 15	7 13	5 46	6 24	6 17	5 33	6 54	4 53	7 26	4 40
13	7 34	5 03	7 07	5 41	6 25	6 13	5 33	6 47	4 53	7 19	4 35	7 43	4 47	7 42	5 16	7 11	5 47	6 22	6 19	5 32	6 55	4 52	7 27	4 40
14	7 33	5 04	7 06	5 42	6 23	6 15	5 32	6 48	4 52	7 20	4 35	7 44	4 48	7 42	5 17	7 10	5 48	6 21	6 20	5 30	6 56	4 51	7 27	4 41
15	7 33	5 05	7 05	5 43	6 21	6 16	5 30	6 49	4 51	7 21	4 35	7 44	4 49	7 41	5 18	7 09	5 49	6 19	6 21	5 29	6 57	4 50	7 28	4 41
16	7 33	5 06	7 03	5 44	6 20	6 17	5 29	6 50	4 50	7 22	4 35	7 44	4 50	7 40	5 19	7 07	5 50	6 17	6 22	5 27	6 59	4 49	7 29	4 41
17	7 32	5 07	7 02	5 45	6 18	6 18	5 27	6 51	4 49	7 23	4 35	7 45	4 50	7 40	5 20	7 06	5 51	6 15	6 23	5 26	7 00	4 48	7 29	4 41
18	7 32	5 08	7 00	5 47	6 16	6 19	5 26	6 52	4 48	7 24	4 35	7 45	4 51	7 39	5 21	7 04	5 52	6 14	6 24	5 24	7 01	4 48	7 30	4 42
19	7 31	5 09	6 59	5 48	6 15	6 20	5 24	6 54	4 47	7 25	4 36	7 45	4 52	7 38	5 22	7 03	5 53	6 12	6 25	5 23	7 02	4 47	7 31	4 42
20	7 31	5 11	6 58	5 49	6 13	6 21	5 22	6 55	4 46	7 26	4 36	7 46	4 53	7 38	5 23	7 01	5 54	6 10	6 26	5 21	7 03	4 46	7 31	4 43
21	7 30	5 12	6 56	5 50	6 11	6 22	5 21	6 56	4 45	7 27	4 36	7 46	4 54	7 37	5 24	7 00	5 55	6 09	6 28	5 20	7 04	4 46	7 32	4 43
22	7 29	5 13	6 55	5 52	6 10	6 23	5 20	6 57	4 45	7 28	4 36	7 46	4 55	7 36	5 25	6 58	5 56	6 07	6 29	5 18	7 06	4 45	7 32	4 44
23	7 29	5 14	6 53	5 53	6 08	6 24	5 18	6 58	4 44	7 28	4 36	7 46	4 56	7 35	5 26	6 57	5 57	6 05	6 30	5 17	7 07	4 44	7 33	4 44
24	7 28	5 15	6 52	5 54	6 06	6 26	5 17	6 59	4 43	7 29	4 37	7 46	4 56	7 34	5 27	6 55	5 58	6 03	6 31	5 15	7 08	4 44	7 33	4 45
25	7 27	5 17	6 50	5 55	6 05	6 27	5 15	7 00	4 42	7 30	4 37	7 46	4 57	7 33	5 28	6 54	5 59	6 02	6 32	5 14	7 09	4 43	7 34	4 45
26	7 26	5 18	6 49	5 56	6 03	6 28	5 14	7 01	4 42	7 31	4 37	7 46	4 58	7 33	5 29	6 52	6 00	6 00	6 33	5 13	7 10	4 43	7 34	4 46
27	7 25	5 19	6 47	5 57	6 01	6 29	5 12	7 02	4 41	7 32	4 38	7 47	4 59	7 32	5 30	6 51	6 02	5 58	6 34	5 11	7 11	4 42	7 34	4 47
28	7 25	5 20	6 46	5 59	6 00	6 30	5 11	7 03	4 41	7 33	4 38	7 47	5 00	7 31	5 31	6 49	6 03	5 57	6 36	5 10	7 12	4 42	7 35	4 47
29	7 24	5 22	6 45	6 00	5 58	6 31	5 10	7 04	4 40	7 34	4 39	7 46	5 01	7 30	5 32	6 47	6 04	5 55	6 37	5 09	7 13	4 42	7 35	4 48
30	7 23	5 23			5 56	6 32	5 08	7 05	4 39	7 34	4 39	7 46	5 02	7 29	5 33	6 46	6 05	5 53	6 38	5 07	7 14	4 41	7 35	4 49
31	7 22	5 24			5 55	6 33			4 39	7 35			5 03	7 27	5 34	6 44			6 39	5 06			7 35	4 50

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT OAKLAND, CALIFORNIA

NO. 1037

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 24	5 01	7 13	5 32	6 41	6 02	5 55	6 31	5 13	6 59	4 49	7 25	4 50	7 34	5 12	7 18	5 39	6 38	6 04	5 52	6 34	5 10	7 05	4 50
2	7 24	5 02	7 12	5 33	6 39	6 03	5 53	6 32	5 12	7 00	4 48	7 25	4 51	7 34	5 13	7 17	5 39	6 37	6 05	5 51	6 35	5 09	7 06	4 50
3	7 25	5 02	7 11	5 35	6 38	6 04	5 52	6 33	5 11	7 01	4 48	7 26	4 51	7 34	5 14	7 16	5 40	6 35	6 06	5 49	6 36	5 08	7 07	4 50
4	7 25	5 03	7 10	5 36	6 36	6 05	5 50	6 34	5 10	7 02	4 48	7 27	4 52	7 34	5 15	7 15	5 41	6 34	6 07	5 48	6 37	5 07	7 08	4 50
5	7 25	5 04	7 09	5 37	6 35	6 06	5 49	6 35	5 09	7 03	4 47	7 27	4 52	7 34	5 15	7 13	5 42	6 32	6 08	5 46	6 38	5 06	7 09	4 50
6	7 25	5 05	7 08	5 38	6 34	6 07	5 47	6 36	5 08	7 03	4 47	7 28	4 53	7 34	5 16	7 12	5 43	6 31	6 09	5 45	6 39	5 05	7 10	4 50
7	7 25	5 06	7 07	5 39	6 32	6 08	5 46	6 37	5 07	7 04	4 47	7 28	4 54	7 33	5 17	7 11	5 44	6 29	6 09	5 43	6 40	5 04	7 11	4 50
8	7 25	5 07	7 06	5 40	6 31	6 09	5 44	6 38	5 06	7 05	4 47	7 29	4 54	7 33	5 18	7 10	5 44	6 28	6 10	5 42	6 41	5 03	7 11	4 50
9	7 24	5 08	7 05	5 41	6 29	6 10	5 43	6 39	5 05	7 06	4 47	7 29	4 55	7 33	5 19	7 09	5 45	6 26	6 11	5 40	6 42	5 03	7 12	4 50
10	7 24	5 09	7 04	5 42	6 28	6 11	5 41	6 40	5 04	7 07	4 46	7 30	4 55	7 32	5 20	7 08	5 46	6 25	6 12	5 39	6 43	5 02	7 13	4 50
11	7 24	5 10	7 03	5 43	6 26	6 12	5 40	6 41	5 03	7 08	4 46	7 30	4 56	7 32	5 21	7 07	5 47	6 23	6 13	5 37	6 44	5 01	7 14	4 50
12	7 24	5 11	7 02	5 44	6 25	6 13	5 38	6 41	5 02	7 09	4 46	7 31	4 57	7 32	5 21	7 06	5 48	6 22	6 14	5 36	6 46	5 00	7 15	4 50
13	7 24	5 12	7 01	5 46	6 23	6 14	5 37	6 42	5 01	7 10	4 46	7 31	4 57	7 31	5 22	7 04	5 49	6 20	6 15	5 35	6 47	4 59	7 15	4 51
14	7 23	5 13	7 00	5 47	6 22	6 15	5 35	6 43	5 00	7 11	4 46	7 32	4 58	7 31	5 23	7 03	5 50	6 19	6 16	5 33	6 48	4 58	7 16	4 51
15	7 23	5 14	6 59	5 48	6 20	6 16	5 34	6 44	4 59	7 11	4 46	7 32	4 59	7 30	5 24	7 02	5 50	6 17	6 17	5 32	6 49	4 58	7 17	4 51
16	7 23	5 15	6 58	5 49	6 19	6 17	5 33	6 45	4 58	7 12	4 46	7 32	4 59	7 30	5 25	7 01	5 51	6 15	6 18	5 30	6 50	4 57	7 17	4 51
17	7 22	5 16	6 56	5 50	6 17	6 18	5 31	6 46	4 58	7 13	4 46	7 33	5 00	7 29	5 26	6 59	5 52	6 14	6 19	5 29	6 51	4 56	7 18	4 52
18	7 22	5 17	6 55	5 51	6 16	6 19	5 30	6 47	4 57	7 14	4 47	7 33	5 01	7 29	5 27	6 58	5 53	6 12	6 20	5 28	6 52	4 56	7 19	4 52
19	7 22	5 18	6 54	5 52	6 14	6 20	5 29	6 48	4 56	7 15	4 47	7 33	5 02	7 28	5 27	6 57	5 54	6 11	6 21	5 26	6 53	4 55	7 19	4 53
20	7 21	5 19	6 53	5 53	6 13	6 21	5 27	6 49	4 55	7 16	4 47	7 34	5 02	7 27	5 28	6 55	5 55	6 09	6 22	5 25	6 54	4 55	7 20	4 53
21	7 21	5 20	6 51	5 54	6 11	6 21	5 26	6 50	4 55	7 16	4 47	7 34	5 03	7 27	5 29	6 54	5 55	6 08	6 23	5 24	6 55	4 54	7 20	4 53
22	7 20	5 21	6 50	5 55	6 10	6 22	5 25	6 51	4 54	7 17	4 47	7 34	5 04	7 26	5 30	6 53	5 56	6 06	6 24	5 22	6 56	4 53	7 21	4 54
23	7 19	5 22	6 49	5 56	6 08	6 23	5 23	6 52	4 53	7 18	4 48	7 34	5 05	7 25	5 31	6 51	5 57	6 05	6 25	5 21	6 57	4 53	7 21	4 55
24	7 19	5 23	6 47	5 57	6 07	6 24	5 22	6 52	4 53	7 19	4 48	7 34	5 05	7 25	5 32	6 50	5 58	6 03	6 26	5 20	6 58	4 53	7 22	4 55
25	7 18	5 25	6 46	5 58	6 05	6 25	5 21	6 53	4 52	7 20	4 48	7 34	5 06	7 24	5 33	6 48	5 59	6 01	6 27	5 19	6 59	4 52	7 22	4 56
26	7 18	5 26	6 45	5 59	6 04	6 26	5 19	6 54	4 51	7 20	4 48	7 35	5 07	7 23	5 33	6 47	6 00	6 00	6 28	5 17	7 00	4 52	7 23	4 56
27	7 17	5 27	6 43	6 00	6 02	6 27	5 18	6 55	4 51	7 21	4 49	7 35	5 08	7 22	5 34	6 46	6 01	5 58	6 29	5 16	7 01	4 51	7 23	4 57
28	7 16	5 28	6 42	6 01	6 01	6 28	5 17	6 56	4 50	7 22	4 49	7 35	5 09	7 21	5 35	6 44	6 01	5 57	6 30	5 15	7 02	4 51	7 23	4 58
29	7 15	5 29	6 42	6 02	5 59	6 29	5 16	6 57	4 50	7 23	4 50	7 35	5 10	7 20	5 36	6 43	6 02	5 55	6 31	5 14	7 03	4 51	7 24	4 58
30	7 15	5 30			5 58	6 30	5 15	6 58	4 49	7 23	4 50	7 35	5 10	7 19	5 37	6 41	6 03	5 54	6 32	5 13	7 04	4 51	7 24	4 59
31	7 14	5 31			5 56	6 31			4 49	7 24			5 11	7 18	5 38	6 40			6 33	5 12			7 24	5 00

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT POMONA, CALIFORNIA

NO. 1038

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	6 57	4 53	6 48	5 21	6 20	5 47	5 39	6 12	5 02	6 35	4 41	6 57	4 43	7 06	5 02	6 52	5 24	6 17	5 45	5 36	6 10	4 58	6 38	4 42
2	6 57	4 53	6 48	5 22	6 19	5 48	5 37	6 12	5 01	6 35	4 40	6 58	4 43	7 06	5 03	6 51	5 25	6 16	5 46	5 34	6 11	4 57	6 39	4 42
3	6 57	4 54	6 47	5 23	6 18	5 49	5 36	6 13	5 00	6 36	4 40	6 58	4 44	7 06	5 03	6 50	5 26	6 14	5 47	5 33	6 12	4 57	6 40	4 42
4	6 57	4 55	6 46	5 24	6 16	5 50	5 35	6 14	4 59	6 37	4 40	6 59	4 44	7 06	5 04	6 49	5 26	6 13	5 47	5 32	6 13	4 56	6 41	4 42
5	6 57	4 56	6 45	5 25	6 15	5 51	5 33	6 15	4 58	6 38	4 40	6 59	4 45	7 06	5 05	6 48	5 27	6 12	5 48	5 30	6 14	4 55	6 42	4 42
6	6 57	4 57	6 44	5 26	6 14	5 51	5 32	6 15	4 57	6 39	4 39	7 00	4 45	7 06	5 06	6 48	5 28	6 10	5 49	5 29	6 15	4 54	6 42	4 42
7	6 57	4 58	6 44	5 27	6 12	5 52	5 31	6 16	4 56	6 39	4 39	7 00	4 46	7 06	5 06	6 47	5 28	6 09	5 50	5 27	6 16	4 53	6 43	4 42
8	6 57	4 58	6 43	5 28	6 11	5 53	5 29	6 17	4 55	6 40	4 39	7 01	4 46	7 05	5 07	6 46	5 29	6 08	5 50	5 26	6 17	4 52	6 44	4 42
9	6 57	4 59	6 42	5 29	6 10	5 54	5 28	6 18	4 54	6 41	4 39	7 01	4 47	7 05	5 08	6 45	5 30	6 06	5 51	5 25	6 18	4 52	6 45	4 42
10	6 57	5 00	6 41	5 30	6 09	5 55	5 27	6 18	4 54	6 42	4 39	7 02	4 47	7 05	5 09	6 44	5 30	6 05	5 52	5 24	6 19	4 51	6 46	4 42
11	6 57	5 01	6 40	5 31	6 07	5 55	5 25	6 19	4 53	6 42	4 39	7 02	4 48	7 04	5 09	6 42	5 31	6 04	5 53	5 22	6 20	4 50	6 46	4 42
12	6 57	5 02	6 39	5 32	6 06	5 56	5 24	6 20	4 52	6 43	4 39	7 03	4 49	7 04	5 10	6 41	5 32	6 02	5 54	5 21	6 21	4 49	6 47	4 42
13	6 57	5 03	6 38	5 33	6 05	5 57	5 23	6 21	4 51	6 44	4 39	7 03	4 49	7 04	5 11	6 40	5 33	6 01	5 54	5 20	6 22	4 49	6 48	4 43
14	6 57	5 04	6 37	5 34	6 03	5 58	5 22	6 21	4 50	6 45	4 39	7 03	4 50	7 03	5 11	6 39	5 33	5 59	5 55	5 18	6 22	4 48	6 48	4 43
15	6 57	5 05	6 36	5 35	6 02	5 59	5 20	6 22	4 50	6 45	4 39	7 04	4 50	7 03	5 12	6 38	5 34	5 58	5 56	5 17	6 23	4 47	6 49	4 43
16	6 56	5 06	6 35	5 36	6 01	5 59	5 19	6 23	4 49	6 46	4 39	7 04	4 51	7 03	5 13	6 37	5 35	5 57	5 57	5 16	6 24	4 47	6 50	4 44
17	6 56	5 07	6 34	5 37	5 59	6 00	5 18	6 24	4 48	6 47	4 39	7 04	4 52	7 02	5 14	6 36	5 35	5 55	5 58	5 15	6 25	4 46	6 50	4 44
18	6 56	5 08	6 33	5 38	5 58	6 01	5 17	6 25	4 47	6 48	4 39	7 05	4 52	7 02	5 14	6 35	5 36	5 54	5 58	5 14	6 26	4 46	6 51	4 44
19	6 55	5 09	6 32	5 38	5 56	6 02	5 15	6 25	4 47	6 48	4 39	7 05	4 53	7 01	5 15	6 34	5 37	5 52	5 59	5 12	6 27	4 45	6 52	4 45
20	6 55	5 10	6 31	5 39	5 55	6 02	5 14	6 26	4 46	6 49	4 40	7 05	4 54	7 01	5 16	6 32	5 37	5 51	6 00	5 11	6 28	4 45	6 52	4 45
21	6 55	5 10	6 30	5 40	5 54	6 03	5 13	6 27	4 46	6 50	4 40	7 05	4 54	7 00	5 17	6 31	5 38	5 49	6 01	5 10	6 29	4 44	6 53	4 46
22	6 54	5 11	6 28	5 41	5 52	6 04	5 12	6 28	4 45	6 50	4 40	7 06	4 55	6 59	5 17	6 30	5 39	5 48	6 02	5 09	6 30	4 44	6 53	4 46
23	6 54	5 12	6 27	5 42	5 51	6 05	5 11	6 28	4 44	6 51	4 40	7 06	4 56	6 59	5 18	6 29	5 40	5 47	6 03	5 08	6 31	4 44	6 54	4 47
24	6 53	5 13	6 26	5 43	5 50	6 06	5 10	6 29	4 44	6 52	4 41	7 06	4 56	6 58	5 19	6 27	5 40	5 45	6 03	5 07	6 32	4 43	6 54	4 47
25	6 53	5 14	6 25	5 44	5 48	6 06	5 08	6 30	4 43	6 53	4 41	7 06	4 57	6 57	5 19	6 26	5 41	5 44	6 04	5 06	6 33	4 43	6 54	4 48
26	6 52	5 15	6 24	5 45	5 47	6 07	5 07	6 31	4 43	6 53	4 41	7 06	4 58	6 57	5 20	6 25	5 42	5 43	6 05	5 04	6 34	4 43	6 55	4 48
27	6 52	5 16	6 23	5 46	5 46	6 08	5 06	6 32	4 43	6 54	4 41	7 06	4 58	6 56	5 21	6 24	5 42	5 41	6 06	5 03	6 35	4 42	6 55	4 49
28	6 51	5 17	6 21	5 46	5 44	6 09	5 05	6 32	4 42	6 55	4 42	7 06	4 59	6 55	5 21	6 22	5 43	5 40	6 07	5 02	6 36	4 42	6 56	4 50
29	6 50	5 18	6 21	5 47	5 43	6 09	5 04	6 33	4 42	6 55	4 42	7 06	5 00	6 54	5 22	6 21	5 44	5 38	6 08	5 01	6 36	4 42	6 56	4 50
30	6 50	5 19			5 41	6 10	5 03	6 34	4 41	6 56	4 43	7 06	5 01	6 54	5 23	6 20	5 45	5 37	6 09	5 00	6 37	4 42	6 56	4 51
31	6 49	5 20			5 40	6 11			4 41	6 56			5 01	6 53	5 24	6 18			6 10	4 59			6 56	4 52

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT RED BLUFF, CALIFORNIA

NO. 1039

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 31	4 54	7 18	5 28	6 43	6 01	5 53	6 33	5 09	7 04	4 42	7 32	4 43	7 42	5 07	7 23	5 36	6 41	6 05	5 52	6 38	5 07	7 12	4 44
2	7 32	4 55	7 17	5 29	6 41	6 02	5 52	6 34	5 08	7 05	4 41	7 33	4 44	7 42	5 08	7 22	5 37	6 39	6 06	5 50	6 39	5 05	7 13	4 44
3	7 32	4 56	7 16	5 30	6 40	6 03	5 50	6 35	5 07	7 06	4 41	7 33	4 44	7 42	5 09	7 21	5 38	6 38	6 07	5 48	6 40	5 04	7 14	4 44
4	7 32	4 57	7 15	5 31	6 38	6 04	5 49	6 36	5 05	7 07	4 41	7 34	4 45	7 42	5 09	7 20	5 39	6 36	6 08	5 47	6 42	5 03	7 15	4 43
5	7 32	4 57	7 14	5 33	6 37	6 05	5 47	6 37	5 04	7 08	4 40	7 35	4 45	7 41	5 10	7 19	5 40	6 35	6 09	5 45	6 43	5 02	7 16	4 43
6	7 32	4 58	7 13	5 34	6 35	6 06	5 45	6 38	5 03	7 09	4 40	7 35	4 46	7 41	5 11	7 18	5 41	6 33	6 10	5 44	6 44	5 01	7 17	4 43
7	7 32	4 59	7 12	5 35	6 34	6 07	5 44	6 39	5 02	7 10	4 40	7 36	4 46	7 41	5 12	7 16	5 42	6 31	6 11	5 42	6 45	5 00	7 18	4 43
8	7 31	5 00	7 11	5 36	6 32	6 08	5 42	6 40	5 01	7 11	4 40	7 37	4 47	7 41	5 13	7 15	5 43	6 30	6 12	5 40	6 46	4 59	7 19	4 43
9	7 31	5 01	7 10	5 37	6 31	6 09	5 41	6 41	5 00	7 12	4 39	7 37	4 48	7 40	5 14	7 14	5 44	6 28	6 13	5 39	6 47	4 58	7 19	4 43
10	7 31	5 02	7 09	5 39	6 29	6 10	5 39	6 42	4 59	7 13	4 39	7 38	4 48	7 40	5 15	7 13	5 45	6 26	6 14	5 37	6 49	4 57	7 20	4 43
11	7 31	5 03	7 07	5 40	6 27	6 11	5 37	6 43	4 57	7 14	4 39	7 38	4 49	7 39	5 16	7 12	5 46	6 25	6 15	5 36	6 50	4 56	7 21	4 43
12	7 31	5 04	7 06	5 41	6 26	6 12	5 36	6 44	4 56	7 15	4 39	7 39	4 50	7 39	5 17	7 10	5 47	6 23	6 16	5 34	6 51	4 55	7 22	4 44
13	7 30	5 06	7 05	5 42	6 24	6 14	5 34	6 45	4 55	7 16	4 39	7 39	4 50	7 38	5 18	7 09	5 48	6 21	6 17	5 33	6 52	4 54	7 23	4 44
14	7 30	5 07	7 04	5 43	6 23	6 15	5 33	6 46	4 54	7 17	4 39	7 39	4 51	7 38	5 19	7 08	5 49	6 20	6 18	5 31	6 53	4 53	7 23	4 44
15	7 30	5 08	7 02	5 44	6 21	6 16	5 31	6 47	4 54	7 18	4 39	7 40	4 52	7 37	5 20	7 06	5 50	6 18	6 19	5 30	6 54	4 53	7 24	4 44
16	7 29	5 09	7 01	5 46	6 19	6 17	5 30	6 48	4 53	7 19	4 39	7 40	4 53	7 37	5 21	7 05	5 51	6 17	6 20	5 28	6 55	4 52	7 25	4 44
17	7 29	5 10	7 00	5 47	6 18	6 18	5 28	6 49	4 52	7 19	4 39	7 41	4 54	7 36	5 22	7 03	5 51	6 15	6 21	5 27	6 57	4 51	7 25	4 45
18	7 28	5 11	6 59	5 48	6 16	6 19	5 27	6 50	4 51	7 20	4 39	7 41	4 54	7 35	5 23	7 02	5 52	6 13	6 23	5 25	6 58	4 50	7 26	4 45
19	7 28	5 12	6 57	5 49	6 15	6 20	5 25	6 51	4 50	7 21	4 39	7 41	4 55	7 35	5 24	7 01	5 53	6 12	6 24	5 24	6 59	4 50	7 27	4 46
20	7 27	5 13	6 56	5 50	6 13	6 21	5 24	6 53	4 49	7 22	4 39	7 41	4 56	7 34	5 25	6 59	5 54	6 10	6 25	5 22	7 00	4 49	7 27	4 46
21	7 27	5 15	6 54	5 51	6 11	6 22	5 23	6 54	4 48	7 23	4 40	7 42	4 57	7 33	5 26	6 58	5 55	6 08	6 26	5 21	7 01	4 48	7 28	4 46
22	7 26	5 16	6 53	5 53	6 10	6 23	5 21	6 55	4 48	7 24	4 40	7 42	4 58	7 33	5 27	6 56	5 56	6 07	6 27	5 20	7 02	4 48	7 28	4 47
23	7 25	5 17	6 52	5 54	6 08	6 24	5 20	6 56	4 47	7 25	4 40	7 42	4 59	7 32	5 28	6 55	5 57	6 05	6 28	5 18	7 03	4 47	7 29	4 48
24	7 25	5 18	6 50	5 55	6 06	6 25	5 18	6 57	4 46	7 26	4 40	7 42	4 59	7 31	5 29	6 53	5 58	6 03	6 29	5 17	7 04	4 47	7 29	4 48
25	7 24	5 19	6 49	5 56	6 05	6 26	5 17	6 58	4 46	7 27	4 41	7 42	5 00	7 30	5 30	6 52	5 59	6 02	6 30	5 15	7 06	4 46	7 30	4 49
26	7 23	5 20	6 47	5 57	6 03	6 27	5 16	6 59	4 45	7 27	4 41	7 42	5 01	7 29	5 31	6 50	6 00	6 00	6 31	5 14	7 07	4 46	7 30	4 49
27	7 22	5 22	6 46	5 58	6 01	6 28	5 14	7 00	4 44	7 28	4 41	7 42	5 02	7 28	5 31	6 49	6 01	5 58	6 32	5 13	7 08	4 45	7 30	4 50
28	7 22	5 23	6 44	5 59	6 00	6 29	5 13	7 01	4 44	7 29	4 42	7 42	5 03	7 27	5 32	6 47	6 02	5 57	6 34	5 12	7 09	4 45	7 31	4 51
29	7 21	5 24	6 44	6 00	5 58	6 30	5 12	7 02	4 43	7 30	4 42	7 42	5 04	7 26	5 33	6 46	6 03	5 55	6 35	5 10	7 10	4 45	7 31	4 51
30	7 20	5 25			5 57	6 31	5 10	7 03	4 43	7 31	4 43	7 42	5 05	7 25	5 34	6 44	6 04	5 53	6 36	5 09	7 11	4 44	7 31	4 52
31	7 19	5 26			5 55	6 32			4 42	7 31			5 06	7 24	5 35	6 43			6 37	5 08			7 31	4 53

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SACRAMENTO, CALIFORNIA

NO. 1040

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 24	4 56	7 12	5 28	6 39	5 59	5 51	6 29	5 09	6 58	4 43	7 24	4 45	7 34	5 07	7 17	5 35	6 36	6 02	5 49	6 32	5 06	7 05	4 45
2	7 24	4 56	7 11	5 29	6 37	6 00	5 50	6 30	5 08	6 59	4 43	7 25	4 46	7 34	5 08	7 16	5 36	6 35	6 02	5 48	6 34	5 05	7 06	4 45
3	7 24	4 57	7 10	5 30	6 36	6 01	5 48	6 31	5 07	7 00	4 43	7 26	4 46	7 34	5 09	7 15	5 37	6 33	6 03	5 46	6 35	5 04	7 07	4 45
4	7 24	4 58	7 09	5 31	6 34	6 02	5 47	6 32	5 06	7 01	4 42	7 26	4 47	7 34	5 10	7 14	5 38	6 32	6 04	5 45	6 36	5 03	7 07	4 45
5	7 24	4 59	7 08	5 32	6 33	6 03	5 45	6 33	5 04	7 01	4 42	7 27	4 47	7 34	5 11	7 12	5 38	6 30	6 05	5 43	6 37	5 02	7 08	4 45
6	7 24	5 00	7 07	5 34	6 31	6 04	5 44	6 34	5 03	7 02	4 42	7 28	4 48	7 33	5 12	7 11	5 39	6 29	6 06	5 41	6 38	5 01	7 09	4 45
7	7 24	5 01	7 06	5 35	6 30	6 05	5 42	6 35	5 02	7 03	4 42	7 28	4 48	7 33	5 13	7 10	5 40	6 27	6 07	5 40	6 39	5 00	7 10	4 45
8	7 24	5 02	7 05	5 36	6 28	6 06	5 41	6 36	5 01	7 04	4 41	7 29	4 49	7 33	5 13	7 09	5 41	6 26	6 08	5 38	6 40	4 59	7 11	4 45
9	7 24	5 03	7 04	5 37	6 27	6 07	5 39	6 37	5 00	7 05	4 41	7 29	4 49	7 32	5 14	7 08	5 42	6 24	6 09	5 37	6 41	4 58	7 12	4 45
10	7 24	5 04	7 03	5 38	6 25	6 08	5 38	6 38	4 59	7 06	4 41	7 30	4 50	7 32	5 15	7 07	5 43	6 22	6 10	5 35	6 42	4 57	7 13	4 45
11	7 24	5 05	7 02	5 39	6 24	6 09	5 36	6 39	4 58	7 07	4 41	7 30	4 51	7 32	5 16	7 05	5 44	6 21	6 11	5 34	6 43	4 56	7 13	4 45
12	7 23	5 06	7 01	5 40	6 22	6 10	5 35	6 40	4 57	7 08	4 41	7 31	4 51	7 31	5 17	7 04	5 45	6 19	6 12	5 33	6 44	4 55	7 14	4 45
13	7 23	5 07	7 00	5 42	6 21	6 11	5 33	6 41	4 56	7 09	4 41	7 31	4 52	7 31	5 18	7 03	5 45	6 18	6 13	5 31	6 46	4 55	7 15	4 45
14	7 23	5 08	6 58	5 43	6 19	6 12	5 32	6 42	4 55	7 10	4 41	7 32	4 53	7 30	5 19	7 02	5 46	6 16	6 14	5 30	6 47	4 54	7 16	4 46
15	7 22	5 09	6 57	5 44	6 18	6 13	5 30	6 42	4 54	7 11	4 41	7 32	4 54	7 30	5 20	7 00	5 47	6 15	6 15	5 28	6 48	4 53	7 16	4 46
16	7 22	5 10	6 56	5 45	6 16	6 14	5 29	6 43	4 54	7 12	4 41	7 32	4 54	7 29	5 21	6 59	5 48	6 13	6 16	5 27	6 49	4 52	7 17	4 46
17	7 22	5 11	6 55	5 46	6 15	6 15	5 27	6 44	4 53	7 12	4 41	7 33	4 55	7 29	5 22	6 58	5 49	6 11	6 17	5 25	6 50	4 52	7 18	4 47
18	7 21	5 12	6 53	5 47	6 13	6 16	5 26	6 45	4 52	7 13	4 41	7 33	4 56	7 28	5 22	6 57	5 50	6 10	6 18	5 24	6 51	4 51	7 18	4 47
19	7 21	5 13	6 52	5 48	6 12	6 17	5 25	6 46	4 51	7 14	4 41	7 33	4 57	7 27	5 23	6 55	5 51	6 08	6 19	5 23	6 52	4 50	7 19	4 47
20	7 20	5 14	6 51	5 49	6 10	6 18	5 23	6 47	4 50	7 15	4 41	7 33	4 57	7 27	5 24	6 54	5 52	6 07	6 20	5 21	6 53	4 50	7 20	4 48
21	7 20	5 15	6 50	5 50	6 08	6 19	5 22	6 48	4 50	7 16	4 42	7 34	4 58	7 26	5 25	6 52	5 53	6 05	6 21	5 20	6 54	4 49	7 20	4 48
22	7 19	5 16	6 48	5 51	6 07	6 20	5 21	6 49	4 49	7 17	4 42	7 34	4 59	7 25	5 26	6 51	5 53	6 03	6 22	5 19	6 55	4 49	7 21	4 49
23	7 19	5 18	6 47	5 52	6 05	6 21	5 19	6 50	4 48	7 18	4 42	7 34	5 00	7 25	5 27	6 50	5 54	6 02	6 23	5 17	6 56	4 48	7 21	4 49
24	7 18	5 19	6 46	5 54	6 04	6 22	5 18	6 51	4 48	7 18	4 42	7 34	5 01	7 24	5 28	6 48	5 55	6 00	6 24	5 16	6 57	4 48	7 21	4 50
25	7 17	5 20	6 44	5 55	6 02	6 23	5 17	6 52	4 47	7 19	4 43	7 34	5 01	7 23	5 29	6 47	5 56	5 59	6 25	5 15	6 59	4 47	7 22	4 50
26	7 17	5 21	6 43	5 56	6 01	6 23	5 15	6 53	4 46	7 20	4 43	7 34	5 02	7 22	5 30	6 45	5 57	5 57	6 26	5 13	7 00	4 47	7 22	4 51
27	7 16	5 22	6 41	5 57	5 59	6 24	5 14	6 54	4 46	7 21	4 43	7 34	5 03	7 21	5 30	6 44	5 58	5 55	6 27	5 12	7 01	4 46	7 23	4 52
28	7 15	5 23	6 40	5 58	5 57	6 25	5 13	6 55	4 45	7 21	4 44	7 34	5 04	7 20	5 31	6 42	5 59	5 54	6 28	5 11	7 02	4 46	7 23	4 52
29	7 14	5 24	6 40	5 59	5 56	6 26	5 11	6 56	4 45	7 22	4 44	7 34	5 05	7 20	5 32	6 41	6 00	5 52	6 29	5 10	7 03	4 46	7 23	4 53
30	7 14	5 26			5 54	6 27	5 10	6 57	4 44	7 23	4 45	7 34	5 06	7 19	5 33	6 39	6 01	5 51	6 30	5 09	7 04	4 46	7 23	4 54
31	7 13	5 27			5 53	6 28			4 44	7 24			5 06	7 18	5 34	6 38			6 31	5 07			7 24	4 55

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SALINAS, CALIFORNIA

NO. S1040-5

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 19	5 01	7 09	5 32	6 37	6 01	5 53	6 28	5 13	6 55	4 49	7 19	4 51	7 29	5 12	7 13	5 37	6 35	6 01	5 50	6 30	5 10	7 00	4 51
2	7 19	5 02	7 08	5 33	6 36	6 02	5 51	6 29	5 12	6 55	4 49	7 20	4 52	7 29	5 13	7 12	5 38	6 33	6 02	5 49	6 31	5 09	7 01	4 51
3	7 19	5 03	7 07	5 34	6 35	6 03	5 50	6 30	5 11	6 56	4 49	7 21	4 52	7 29	5 14	7 11	5 39	6 32	6 03	5 47	6 32	5 08	7 02	4 50
4	7 19	5 04	7 06	5 35	6 33	6 04	5 48	6 31	5 10	6 57	4 48	7 21	4 53	7 29	5 14	7 10	5 40	6 31	6 04	5 46	6 33	5 07	7 03	4 50
5	7 19	5 05	7 05	5 36	6 32	6 04	5 47	6 32	5 09	6 58	4 48	7 22	4 53	7 28	5 15	7 09	5 40	6 29	6 05	5 44	6 34	5 06	7 04	4 50
6	7 19	5 05	7 04	5 37	6 31	6 05	5 46	6 33	5 08	6 59	4 48	7 22	4 54	7 28	5 16	7 08	5 41	6 28	6 06	5 43	6 35	5 05	7 04	4 50
7	7 19	5 06	7 03	5 38	6 29	6 06	5 44	6 34	5 07	7 00	4 48	7 23	4 54	7 28	5 17	7 07	5 42	6 26	6 06	5 41	6 36	5 04	7 05	4 50
8	7 19	5 07	7 02	5 39	6 28	6 07	5 43	6 35	5 06	7 01	4 47	7 23	4 55	7 28	5 18	7 06	5 43	6 25	6 07	5 40	6 37	5 03	7 06	4 50
9	7 19	5 08	7 01	5 41	6 26	6 08	5 41	6 35	5 05	7 01	4 47	7 24	4 55	7 27	5 18	7 05	5 44	6 23	6 08	5 39	6 38	5 02	7 07	4 50
10	7 19	5 09	7 00	5 42	6 25	6 09	5 40	6 36	5 04	7 02	4 47	7 24	4 56	7 27	5 19	7 04	5 44	6 22	6 09	5 37	6 39	5 01	7 08	4 51
11	7 19	5 10	6 59	5 43	6 24	6 10	5 38	6 37	5 03	7 03	4 47	7 25	4 57	7 27	5 20	7 02	5 45	6 20	6 10	5 36	6 40	5 01	7 09	4 51
12	7 19	5 11	6 58	5 44	6 22	6 11	5 37	6 38	5 02	7 04	4 47	7 25	4 57	7 26	5 21	7 01	5 46	6 19	6 11	5 34	6 41	5 00	7 09	4 51
13	7 19	5 12	6 57	5 45	6 21	6 12	5 36	6 39	5 01	7 05	4 47	7 26	4 58	7 26	5 22	7 00	5 47	6 17	6 12	5 33	6 42	4 59	7 10	4 51
14	7 18	5 13	6 56	5 46	6 19	6 13	5 34	6 40	5 00	7 06	4 47	7 26	4 58	7 26	5 23	6 59	5 48	6 16	6 13	5 32	6 43	4 58	7 11	4 51
15	7 18	5 14	6 55	5 47	6 18	6 14	5 33	6 41	4 59	7 07	4 47	7 27	4 59	7 25	5 23	6 58	5 48	6 14	6 14	5 30	6 44	4 58	7 11	4 52
16	7 18	5 15	6 54	5 48	6 16	6 15	5 32	6 41	4 58	7 07	4 47	7 27	5 00	7 25	5 24	6 56	5 49	6 13	6 14	5 29	6 45	4 57	7 12	4 52
17	7 17	5 16	6 53	5 49	6 15	6 15	5 30	6 42	4 58	7 08	4 47	7 27	5 01	7 24	5 25	6 55	5 50	6 11	6 15	5 28	6 46	4 56	7 13	4 52
18	7 17	5 17	6 51	5 50	6 13	6 16	5 29	6 43	4 57	7 09	4 47	7 28	5 01	7 23	5 26	6 54	5 51	6 10	6 16	5 26	6 47	4 56	7 13	4 53
19	7 17	5 18	6 50	5 51	6 12	6 17	5 28	6 44	4 56	7 10	4 47	7 28	5 02	7 23	5 27	6 53	5 52	6 08	6 17	5 25	6 48	4 55	7 14	4 53
20	7 16	5 19	6 49	5 52	6 10	6 18	5 26	6 45	4 55	7 11	4 48	7 28	5 03	7 22	5 28	6 51	5 52	6 07	6 18	5 24	6 49	4 55	7 14	4 54
21	7 16	5 20	6 48	5 53	6 09	6 19	5 25	6 46	4 55	7 11	4 48	7 28	5 03	7 22	5 28	6 50	5 53	6 05	6 19	5 23	6 50	4 54	7 15	4 54
22	7 15	5 21	6 47	5 54	6 07	6 20	5 24	6 47	4 54	7 12	4 48	7 28	5 04	7 21	5 29	6 49	5 54	6 04	6 20	5 21	6 51	4 54	7 16	4 55
23	7 15	5 22	6 45	5 55	6 06	6 21	5 22	6 48	4 54	7 13	4 48	7 29	5 05	7 20	5 30	6 47	5 55	6 02	6 21	5 20	6 52	4 53	7 16	4 55
24	7 14	5 23	6 44	5 56	6 05	6 22	5 21	6 48	4 53	7 14	4 49	7 29	5 06	7 20	5 31	6 46	5 56	6 01	6 22	5 19	6 53	4 53	7 16	4 56
25	7 14	5 24	6 43	5 57	6 03	6 22	5 20	6 49	4 52	7 14	4 49	7 29	5 06	7 19	5 32	6 45	5 56	5 59	6 23	5 18	6 54	4 52	7 17	4 56
26	7 13	5 26	6 41	5 58	6 02	6 23	5 19	6 50	4 52	7 15	4 49	7 29	5 07	7 18	5 32	6 43	5 57	5 58	6 24	5 16	6 55	4 52	7 17	4 57
27	7 12	5 27	6 40	5 59	6 00	6 24	5 18	6 51	4 51	7 16	4 50	7 29	5 08	7 17	5 33	6 42	5 58	5 56	6 25	5 15	6 56	4 52	7 18	4 58
28	7 12	5 28	6 39	6 00	5 59	6 25	5 16	6 52	4 51	7 17	4 50	7 29	5 09	7 16	5 34	6 41	5 59	5 55	6 26	5 14	6 57	4 51	7 18	4 58
29	7 11	5 29	6 38	6 01	5 57	6 26	5 15	6 53	4 50	7 17	4 50	7 29	5 10	7 16	5 35	6 39	6 00	5 53	6 27	5 13	6 58	4 51	7 18	4 59
30	7 10	5 30			5 56	6 27	5 14	6 54	4 50	7 18	4 51	7 29	5 10	7 15	5 36	6 38	6 01	5 52	6 28	5 12	6 59	4 51	7 18	5 00
31	7 09	5 31			5 54	6 28			4 50	7 19			5 11	7 14	5 36	6 36			6 29	5 11			7 19	5 00

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SAN BERNARDINO, CALIFORNIA

NO. 1041

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	6 55	4 51	6 47	5 19	6 18	5 45	5 37	6 10	5 00	6 33	4 39	6 55	4 41	7 05	5 00	6 50	5 22	6 15	5 43	5 34	6 09	4 57	6 37	4 40
2	6 55	4 51	6 46	5 20	6 17	5 46	5 36	6 11	4 59	6 34	4 38	6 56	4 41	7 05	5 01	6 50	5 23	6 14	5 44	5 32	6 10	4 56	6 37	4 40
3	6 55	4 52	6 45	5 21	6 16	5 47	5 34	6 11	4 58	6 34	4 38	6 57	4 42	7 05	5 02	6 49	5 24	6 13	5 45	5 31	6 11	4 55	6 38	4 40
4	6 56	4 53	6 44	5 22	6 15	5 48	5 33	6 12	4 57	6 35	4 38	6 57	4 42	7 04	5 02	6 48	5 24	6 11	5 46	5 30	6 11	4 54	6 39	4 40
5	6 56	4 54	6 44	5 23	6 13	5 49	5 32	6 13	4 56	6 36	4 38	6 58	4 43	7 04	5 03	6 47	5 25	6 10	5 46	5 28	6 12	4 53	6 40	4 40
6	6 56	4 55	6 43	5 24	6 12	5 50	5 30	6 14	4 55	6 37	4 37	6 58	4 43	7 04	5 04	6 46	5 26	6 09	5 47	5 27	6 13	4 52	6 41	4 40
7	6 56	4 56	6 42	5 25	6 11	5 50	5 29	6 14	4 54	6 38	4 37	6 59	4 44	7 04	5 04	6 45	5 27	6 07	5 48	5 26	6 14	4 51	6 42	4 40
8	6 56	4 56	6 41	5 26	6 09	5 51	5 28	6 15	4 53	6 38	4 37	6 59	4 44	7 04	5 05	6 44	5 27	6 06	5 49	5 24	6 15	4 50	6 42	4 40
9	6 56	4 57	6 40	5 27	6 08	5 52	5 26	6 16	4 52	6 39	4 37	7 00	4 45	7 03	5 06	6 43	5 28	6 05	5 49	5 23	6 16	4 50	6 43	4 40
10	6 56	4 58	6 39	5 28	6 07	5 53	5 25	6 17	4 52	6 40	4 37	7 00	4 45	7 03	5 07	6 42	5 29	6 03	5 50	5 22	6 17	4 49	6 44	4 40
11	6 56	4 59	6 38	5 29	6 05	5 54	5 24	6 17	4 51	6 41	4 37	7 01	4 46	7 03	5 07	6 41	5 29	6 02	5 51	5 20	6 18	4 48	6 45	4 40
12	6 55	5 00	6 37	5 30	6 04	5 54	5 22	6 18	4 50	6 41	4 37	7 01	4 47	7 03	5 08	6 40	5 30	6 00	5 52	5 19	6 19	4 47	6 45	4 40
13	6 55	5 01	6 36	5 31	6 03	5 55	5 21	6 19	4 49	6 42	4 37	7 01	4 47	7 02	5 09	6 39	5 31	5 59	5 53	5 18	6 20	4 47	6 46	4 41
14	6 55	5 02	6 35	5 32	6 01	5 56	5 20	6 20	4 48	6 43	4 37	7 02	4 48	7 02	5 10	6 38	5 31	5 58	5 53	5 17	6 21	4 46	6 47	4 41
15	6 55	5 03	6 34	5 33	6 00	5 57	5 19	6 21	4 48	6 44	4 37	7 02	4 48	7 01	5 10	6 36	5 32	5 56	5 54	5 15	6 22	4 46	6 47	4 41
16	6 55	5 04	6 33	5 34	5 59	5 58	5 17	6 21	4 47	6 44	4 37	7 03	4 49	7 01	5 11	6 35	5 33	5 55	5 55	5 14	6 23	4 45	6 48	4 42
17	6 54	5 05	6 32	5 35	5 57	5 58	5 16	6 22	4 46	6 45	4 37	7 03	4 50	7 00	5 12	6 34	5 34	5 53	5 56	5 13	6 24	4 44	6 49	4 42
18	6 54	5 06	6 31	5 36	5 56	5 59	5 15	6 23	4 46	6 46	4 37	7 03	4 50	7 00	5 12	6 33	5 34	5 52	5 57	5 12	6 25	4 44	6 49	4 42
19	6 54	5 07	6 30	5 37	5 55	6 00	5 14	6 24	4 45	6 47	4 37	7 03	4 51	6 59	5 13	6 32	5 35	5 51	5 57	5 11	6 26	4 43	6 50	4 43
20	6 53	5 08	6 29	5 37	5 53	6 01	5 12	6 24	4 44	6 47	4 38	7 04	4 52	6 59	5 14	6 31	5 36	5 49	5 58	5 09	6 26	4 43	6 50	4 43
21	6 53	5 09	6 28	5 38	5 52	6 01	5 11	6 25	4 44	6 48	4 38	7 04	4 52	6 58	5 15	6 29	5 36	5 48	5 59	5 08	6 27	4 42	6 51	4 44
22	6 53	5 10	6 27	5 39	5 51	6 02	5 10	6 26	4 43	6 49	4 38	7 04	4 53	6 58	5 15	6 28	5 37	5 46	6 00	5 07	6 28	4 42	6 51	4 44
23	6 52	5 11	6 26	5 40	5 49	6 03	5 09	6 27	4 43	6 50	4 38	7 04	4 54	6 57	5 16	6 27	5 38	5 45	6 01	5 06	6 29	4 42	6 52	4 45
24	6 52	5 11	6 24	5 41	5 48	6 04	5 08	6 27	4 42	6 50	4 39	7 04	4 54	6 56	5 17	6 26	5 38	5 43	6 02	5 05	6 30	4 41	6 52	4 45
25	6 51	5 12	6 23	5 42	5 46	6 05	5 07	6 28	4 41	6 51	4 39	7 05	4 55	6 56	5 17	6 24	5 39	5 42	6 03	5 04	6 31	4 41	6 53	4 46
26	6 51	5 13	6 22	5 43	5 45	6 05	5 05	6 29	4 41	6 52	4 39	7 05	4 56	6 55	5 18	6 23	5 40	5 41	6 03	5 03	6 32	4 41	6 53	4 46
27	6 50	5 14	6 21	5 44	5 44	6 06	5 04	6 30	4 41	6 52	4 40	7 05	4 56	6 54	5 19	6 22	5 41	5 39	6 04	5 02	6 33	4 40	6 54	4 47
28	6 49	5 15	6 20	5 45	5 42	6 07	5 03	6 31	4 40	6 53	4 40	7 05	4 57	6 54	5 20	6 21	5 41	5 38	6 05	5 00	6 34	4 40	6 54	4 48
29	6 49	5 16	6 19	5 45	5 41	6 08	5 02	6 31	4 40	6 54	4 40	7 05	4 58	6 53	5 20	6 19	5 42	5 37	6 06	4 59	6 35	4 40	6 54	4 48
30	6 48	5 17			5 40	6 08	5 01	6 32	4 39	6 54	4 41	7 05	4 59	6 52	5 21	6 18	5 43	5 35	6 07	4 58	6 36	4 40	6 55	4 49
31	6 47	5 18			5 38	6 09			4 39	6 55			4 59	6 51	5 22	6 17			6 08	4 57			6 55	4 50

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SANDBERG, CALIFORNIA

NO. 1042

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 02	4 55	6 54	5 24	6 25	5 51	5 42	6 16	5 05	6 40	4 43	7 03	4 45	7 12	5 05	6 57	5 28	6 22	5 49	5 39	6 15	5 01	6 44	4 44
2	7 03	4 56	6 53	5 25	6 23	5 52	5 41	6 17	5 04	6 41	4 42	7 03	4 45	7 12	5 05	6 56	5 28	6 20	5 50	5 38	6 16	5 00	6 45	4 44
3	7 03	4 56	6 52	5 26	6 22	5 52	5 40	6 18	5 03	6 41	4 42	7 04	4 46	7 12	5 06	6 56	5 29	6 19	5 51	5 37	6 17	4 59	6 46	4 44
4	7 03	4 57	6 51	5 27	6 21	5 53	5 38	6 18	5 02	6 42	4 42	7 05	4 46	7 12	5 07	6 55	5 30	6 18	5 52	5 35	6 18	4 58	6 46	4 44
5	7 03	4 58	6 50	5 28	6 19	5 54	5 37	6 19	5 01	6 43	4 42	7 05	4 47	7 12	5 08	6 54	5 30	6 16	5 52	5 34	6 19	4 58	6 47	4 44
6	7 03	4 59	6 50	5 29	6 18	5 55	5 35	6 20	5 00	6 44	4 42	7 06	4 47	7 12	5 08	6 53	5 31	6 15	5 53	5 32	6 20	4 57	6 48	4 44
7	7 03	5 00	6 49	5 30	6 17	5 56	5 34	6 21	4 59	6 45	4 41	7 06	4 48	7 11	5 09	6 52	5 32	6 13	5 54	5 31	6 21	4 56	6 49	4 44
8	7 03	5 01	6 48	5 31	6 15	5 57	5 33	6 21	4 58	6 45	4 41	7 07	4 48	7 11	5 10	6 51	5 33	6 12	5 55	5 30	6 22	4 55	6 50	4 44
9	7 03	5 02	6 47	5 32	6 14	5 57	5 31	6 22	4 57	6 46	4 41	7 07	4 49	7 11	5 11	6 50	5 33	6 11	5 56	5 28	6 23	4 54	6 51	4 44
10	7 03	5 02	6 46	5 33	6 13	5 58	5 30	6 23	4 56	6 47	4 41	7 08	4 50	7 11	5 11	6 49	5 34	6 09	5 56	5 27	6 24	4 53	6 51	4 44
11	7 03	5 03	6 45	5 34	6 11	5 59	5 29	6 24	4 55	6 48	4 41	7 08	4 50	7 10	5 12	6 48	5 35	6 08	5 57	5 26	6 25	4 53	6 52	4 44
12	7 03	5 04	6 44	5 35	6 10	6 00	5 27	6 25	4 54	6 48	4 41	7 08	4 51	7 10	5 13	6 47	5 35	6 06	5 58	5 24	6 26	4 52	6 53	4 45
13	7 02	5 05	6 43	5 36	6 09	6 01	5 26	6 25	4 54	6 49	4 41	7 09	4 51	7 09	5 14	6 45	5 36	6 05	5 59	5 23	6 27	4 51	6 53	4 45
14	7 02	5 06	6 42	5 37	6 07	6 02	5 25	6 26	4 53	6 50	4 41	7 09	4 52	7 09	5 14	6 44	5 37	6 04	6 00	5 22	6 28	4 51	6 54	4 45
15	7 02	5 07	6 41	5 38	6 06	6 02	5 24	6 27	4 52	6 51	4 41	7 10	4 53	7 09	5 15	6 43	5 38	6 02	6 00	5 21	6 29	4 50	6 55	4 45
16	7 02	5 08	6 40	5 39	6 05	6 03	5 22	6 28	4 51	6 52	4 41	7 10	4 53	7 08	5 16	6 42	5 38	6 01	6 01	5 19	6 30	4 49	6 55	4 46
17	7 02	5 09	6 39	5 40	6 03	6 04	5 21	6 29	4 51	6 52	4 41	7 10	4 54	7 08	5 17	6 41	5 39	5 59	6 02	5 18	6 31	4 49	6 56	4 46
18	7 01	5 10	6 38	5 41	6 02	6 05	5 20	6 29	4 50	6 53	4 41	7 11	4 55	7 07	5 17	6 40	5 40	5 58	6 03	5 17	6 32	4 48	6 57	4 46
19	7 01	5 11	6 37	5 42	6 00	6 06	5 19	6 30	4 49	6 54	4 41	7 11	4 55	7 07	5 18	6 38	5 41	5 56	6 04	5 16	6 33	4 48	6 57	4 47
20	7 00	5 12	6 35	5 43	5 59	6 06	5 17	6 31	4 49	6 55	4 42	7 11	4 56	7 06	5 19	6 37	5 41	5 55	6 05	5 14	6 34	4 47	6 58	4 47
21	7 00	5 13	6 34	5 43	5 58	6 07	5 16	6 32	4 48	6 55	4 42	7 11	4 57	7 06	5 20	6 36	5 42	5 53	6 06	5 13	6 35	4 47	6 58	4 48
22	7 00	5 14	6 33	5 44	5 56	6 08	5 15	6 33	4 47	6 56	4 42	7 12	4 57	7 05	5 20	6 35	5 43	5 52	6 06	5 12	6 35	4 46	6 59	4 48
23	6 59	5 15	6 32	5 45	5 55	6 09	5 14	6 33	4 47	6 57	4 42	7 12	4 58	7 04	5 21	6 34	5 43	5 51	6 07	5 11	6 36	4 46	6 59	4 49
24	6 59	5 16	6 31	5 46	5 53	6 10	5 13	6 34	4 46	6 57	4 43	7 12	4 59	7 04	5 22	6 32	5 44	5 49	6 08	5 10	6 37	4 46	7 00	4 49
25	6 58	5 17	6 30	5 47	5 52	6 10	5 11	6 35	4 46	6 58	4 43	7 12	4 59	7 03	5 22	6 31	5 45	5 48	6 09	5 09	6 38	4 45	7 00	4 50
26	6 58	5 18	6 28	5 48	5 51	6 11	5 10	6 36	4 45	6 59	4 43	7 12	5 00	7 02	5 23	6 30	5 46	5 46	6 10	5 08	6 39	4 45	7 01	4 51
27	6 57	5 19	6 27	5 49	5 49	6 12	5 09	6 37	4 45	7 00	4 44	7 12	5 01	7 01	5 24	6 28	5 46	5 45	6 11	5 06	6 40	4 45	7 01	4 51
28	6 56	5 20	6 26	5 50	5 48	6 13	5 08	6 37	4 44	7 00	4 44	7 12	5 02	7 01	5 25	6 27	5 47	5 44	6 12	5 05	6 41	4 45	7 01	4 52
29	6 56	5 21	6 26	5 51	5 46	6 14	5 07	6 38	4 44	7 01	4 44	7 12	5 02	7 00	5 25	6 26	5 48	5 42	6 13	5 04	6 42	4 44	7 02	4 53
30	6 55	5 22			5 45	6 14	5 06	6 39	4 43	7 02	4 45	7 12	5 03	6 59	5 26	6 24	5 49	5 41	6 14	5 03	6 43	4 44	7 02	4 53
31	6 54	5 23			5 44	6 15			4 43	7 02			5 04	6 58	5 27	6 23			6 14	5 02			7 02	4 54

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SAN DIEGO, CALIFORNIA

NO. 1043

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	6 51	4 54	6 44	5 21	6 17	5 46	5 37	6 09	5 02	6 30	4 42	6 51	4 44	7 01	5 02	6 47	5 23	6 14	5 43	5 34	6 06	4 58	6 33	4 42
2	6 51	4 54	6 43	5 22	6 16	5 47	5 36	6 09	5 01	6 31	4 41	6 52	4 45	7 00	5 03	6 46	5 24	6 12	5 43	5 32	6 07	4 57	6 34	4 42
3	6 51	4 55	6 42	5 23	6 14	5 47	5 34	6 10	5 00	6 32	4 41	6 53	4 45	7 00	5 04	6 45	5 24	6 11	5 44	5 31	6 08	4 56	6 35	4 42
4	6 52	4 56	6 42	5 24	6 13	5 48	5 33	6 11	4 59	6 32	4 41	6 53	4 45	7 00	5 04	6 45	5 25	6 10	5 45	5 30	6 09	4 55	6 35	4 42
5	6 52	4 57	6 41	5 25	6 12	5 49	5 32	6 11	4 58	6 33	4 41	6 54	4 46	7 00	5 05	6 44	5 26	6 08	5 45	5 28	6 10	4 55	6 36	4 42
6	6 52	4 58	6 40	5 26	6 11	5 50	5 31	6 12	4 57	6 34	4 40	6 54	4 46	7 00	5 06	6 43	5 26	6 07	5 46	5 27	6 11	4 54	6 37	4 42
7	6 52	4 58	6 39	5 27	6 10	5 50	5 29	6 13	4 56	6 35	4 40	6 55	4 47	7 00	5 06	6 42	5 27	6 06	5 47	5 26	6 11	4 53	6 38	4 42
8	6 52	4 59	6 38	5 28	6 08	5 51	5 28	6 14	4 55	6 35	4 40	6 55	4 47	7 00	5 07	6 41	5 28	6 05	5 47	5 25	6 12	4 52	6 38	4 43
9	6 52	5 00	6 38	5 29	6 07	5 52	5 27	6 14	4 55	6 36	4 40	6 56	4 48	6 59	5 08	6 40	5 28	6 03	5 48	5 23	6 13	4 52	6 39	4 43
10	6 52	5 01	6 37	5 30	6 06	5 53	5 26	6 15	4 54	6 37	4 40	6 56	4 48	6 59	5 08	6 39	5 29	6 02	5 49	5 22	6 14	4 51	6 40	4 43
11	6 52	5 02	6 36	5 31	6 04	5 54	5 24	6 16	4 53	6 37	4 40	6 56	4 49	6 59	5 09	6 38	5 30	6 01	5 50	5 21	6 15	4 50	6 41	4 43
12	6 52	5 03	6 35	5 31	6 03	5 54	5 23	6 16	4 52	6 38	4 40	6 57	4 50	6 59	5 10	6 37	5 30	5 59	5 50	5 20	6 16	4 49	6 41	4 43
13	6 52	5 04	6 34	5 32	6 02	5 55	5 22	6 17	4 51	6 39	4 40	6 57	4 50	6 58	5 10	6 36	5 31	5 58	5 51	5 18	6 17	4 49	6 42	4 44
14	6 51	5 04	6 33	5 33	6 01	5 56	5 21	6 18	4 51	6 40	4 40	6 58	4 51	6 58	5 11	6 35	5 31	5 56	5 52	5 17	6 18	4 48	6 43	4 44
15	6 51	5 05	6 32	5 34	5 59	5 56	5 19	6 19	4 50	6 40	4 40	6 58	4 51	6 58	5 12	6 34	5 32	5 55	5 53	5 16	6 19	4 48	6 43	4 44
16	6 51	5 06	6 31	5 35	5 58	5 57	5 18	6 19	4 49	6 41	4 40	6 58	4 52	6 57	5 13	6 33	5 33	5 54	5 53	5 15	6 19	4 47	6 44	4 45
17	6 51	5 07	6 30	5 36	5 57	5 58	5 17	6 20	4 49	6 42	4 40	6 59	4 52	6 57	5 13	6 32	5 33	5 52	5 54	5 14	6 20	4 47	6 45	4 45
18	6 51	5 08	6 29	5 37	5 55	5 59	5 16	6 21	4 48	6 42	4 40	6 59	4 53	6 56	5 14	6 31	5 34	5 51	5 55	5 12	6 21	4 46	6 45	4 45
19	6 50	5 09	6 28	5 38	5 54	5 59	5 15	6 21	4 47	6 43	4 41	6 59	4 54	6 56	5 15	6 29	5 35	5 50	5 56	5 11	6 22	4 46	6 46	4 46
20	6 50	5 10	6 27	5 38	5 53	6 00	5 14	6 22	4 47	6 44	4 41	6 59	4 54	6 55	5 15	6 28	5 35	5 48	5 56	5 10	6 23	4 45	6 46	4 46
21	6 50	5 11	6 26	5 39	5 52	6 01	5 12	6 23	4 46	6 44	4 41	7 00	4 55	6 55	5 16	6 27	5 36	5 47	5 57	5 09	6 24	4 45	6 47	4 47
22	6 49	5 12	6 25	5 40	5 50	6 02	5 11	6 24	4 46	6 45	4 41	7 00	4 56	6 54	5 17	6 26	5 37	5 46	5 58	5 08	6 25	4 44	6 47	4 47
23	6 49	5 13	6 24	5 41	5 49	6 02	5 10	6 24	4 45	6 46	4 41	7 00	4 56	6 53	5 17	6 25	5 37	5 44	5 59	5 07	6 26	4 44	6 48	4 48
24	6 48	5 14	6 23	5 42	5 48	6 03	5 09	6 25	4 45	6 46	4 42	7 00	4 57	6 53	5 18	6 24	5 38	5 43	6 00	5 06	6 27	4 44	6 48	4 48
25	6 48	5 15	6 21	5 43	5 46	6 04	5 08	6 26	4 44	6 47	4 42	7 00	4 58	6 52	5 19	6 22	5 39	5 42	6 00	5 05	6 28	4 44	6 49	4 49
26	6 47	5 16	6 20	5 43	5 45	6 04	5 07	6 26	4 44	6 48	4 42	7 00	4 58	6 52	5 19	6 21	5 39	5 40	6 01	5 04	6 28	4 43	6 49	4 49
27	6 47	5 17	6 19	5 44	5 44	6 05	5 06	6 27	4 43	6 48	4 43	7 00	4 59	6 51	5 20	6 20	5 40	5 39	6 02	5 03	6 29	4 43	6 50	4 50
28	6 46	5 18	6 18	5 45	5 42	6 06	5 05	6 28	4 43	6 49	4 43	7 01	5 00	6 50	5 21	6 19	5 41	5 38	6 03	5 02	6 30	4 43	6 50	4 51
29	6 46	5 18	6 18	5 46	5 41	6 06	5 04	6 29	4 43	6 50	4 43	7 01	5 00	6 49	5 21	6 17	5 41	5 36	6 04	5 01	6 31	4 43	6 50	4 51
30	6 45	5 19			5 40	6 07	5 03	6 29	4 42	6 50	4 44	7 01	5 01	6 49	5 22	6 16	5 42	5 35	6 04	5 00	6 32	4 43	6 51	4 52
31	6 44	5 20			5 38	6 08			4 42	6 51			5 02	6 48	5 22	6 15			6 05	4 59			6 51	4 53

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SAN FRANCISCO, CALIFORNIA

NO. 1044

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 25	5 02	7 14	5 33	6 42	6 03	5 55	6 32	5 14	7 00	4 49	7 26	4 51	7 35	5 13	7 19	5 39	6 39	6 05	5 53	6 35	5 11	7 06	4 51
2	7 25	5 02	7 13	5 34	6 40	6 04	5 54	6 33	5 13	7 01	4 49	7 26	4 52	7 35	5 14	7 18	5 40	6 38	6 06	5 52	6 36	5 10	7 07	4 51
3	7 26	5 03	7 12	5 35	6 39	6 05	5 52	6 34	5 12	7 02	4 49	7 27	4 52	7 35	5 14	7 17	5 41	6 36	6 07	5 50	6 37	5 09	7 08	4 51
4	7 26	5 04	7 11	5 36	6 37	6 06	5 51	6 35	5 11	7 03	4 48	7 28	4 53	7 35	5 15	7 15	5 42	6 35	6 08	5 49	6 38	5 08	7 09	4 51
5	7 26	5 05	7 10	5 38	6 36	6 07	5 49	6 36	5 10	7 04	4 48	7 28	4 53	7 35	5 16	7 14	5 43	6 33	6 09	5 47	6 39	5 07	7 10	4 51
6	7 26	5 06	7 09	5 39	6 35	6 08	5 48	6 37	5 09	7 04	4 48	7 29	4 54	7 35	5 17	7 13	5 44	6 32	6 09	5 46	6 40	5 06	7 11	4 51
7	7 26	5 07	7 08	5 40	6 33	6 09	5 46	6 38	5 08	7 05	4 48	7 29	4 54	7 34	5 18	7 12	5 44	6 30	6 10	5 44	6 41	5 05	7 12	4 51
8	7 26	5 08	7 07	5 41	6 32	6 10	5 45	6 39	5 07	7 06	4 47	7 30	4 55	7 34	5 19	7 11	5 45	6 29	6 11	5 43	6 42	5 04	7 12	4 51
9	7 25	5 09	7 06	5 42	6 30	6 11	5 43	6 40	5 06	7 07	4 47	7 30	4 55	7 34	5 20	7 10	5 46	6 27	6 12	5 41	6 43	5 03	7 13	4 51
10	7 25	5 10	7 05	5 43	6 29	6 12	5 42	6 41	5 05	7 08	4 47	7 31	4 56	7 33	5 20	7 09	5 47	6 26	6 13	5 40	6 44	5 02	7 14	4 51
11	7 25	5 10	7 04	5 44	6 27	6 13	5 41	6 41	5 04	7 09	4 47	7 31	4 57	7 33	5 21	7 08	5 48	6 24	6 14	5 38	6 45	5 02	7 15	4 51
12	7 25	5 11	7 03	5 45	6 26	6 14	5 39	6 42	5 03	7 10	4 47	7 32	4 57	7 33	5 22	7 06	5 49	6 23	6 15	5 37	6 47	5 01	7 16	4 51
13	7 25	5 12	7 02	5 46	6 24	6 15	5 38	6 43	5 02	7 11	4 47	7 32	4 58	7 32	5 23	7 05	5 50	6 21	6 16	5 35	6 48	5 00	7 16	4 51
14	7 24	5 13	7 01	5 47	6 23	6 16	5 36	6 44	5 01	7 12	4 47	7 33	4 59	7 32	5 24	7 04	5 50	6 19	6 17	5 34	6 49	4 59	7 17	4 52
15	7 24	5 15	7 00	5 49	6 21	6 17	5 35	6 45	5 00	7 12	4 47	7 33	4 59	7 31	5 25	7 03	5 51	6 18	6 18	5 33	6 50	4 59	7 18	4 52
16	7 24	5 16	6 59	5 50	6 20	6 18	5 34	6 46	4 59	7 13	4 47	7 33	5 00	7 31	5 26	7 01	5 52	6 16	6 19	5 31	6 51	4 58	7 18	4 52
17	7 23	5 17	6 57	5 51	6 18	6 19	5 32	6 47	4 58	7 14	4 47	7 34	5 01	7 30	5 27	7 00	5 53	6 15	6 20	5 30	6 52	4 57	7 19	4 52
18	7 23	5 18	6 56	5 52	6 17	6 20	5 31	6 48	4 58	7 15	4 47	7 34	5 02	7 30	5 27	6 59	5 54	6 13	6 21	5 28	6 53	4 56	7 20	4 53
19	7 23	5 19	6 55	5 53	6 15	6 20	5 29	6 49	4 57	7 16	4 47	7 34	5 02	7 29	5 28	6 58	5 55	6 12	6 22	5 27	6 54	4 56	7 20	4 53
20	7 22	5 20	6 54	5 54	6 14	6 21	5 28	6 50	4 56	7 17	4 48	7 35	5 03	7 28	5 29	6 56	5 55	6 10	6 23	5 26	6 55	4 55	7 21	4 54
21	7 22	5 21	6 52	5 55	6 12	6 22	5 27	6 51	4 55	7 17	4 48	7 35	5 04	7 28	5 30	6 55	5 56	6 09	6 24	5 24	6 56	4 55	7 21	4 54
22	7 21	5 22	6 51	5 56	6 11	6 23	5 25	6 52	4 55	7 18	4 48	7 35	5 05	7 27	5 31	6 54	5 57	6 07	6 25	5 23	6 57	4 54	7 22	4 55
23	7 20	5 23	6 50	5 57	6 09	6 24	5 24	6 52	4 54	7 19	4 48	7 35	5 05	7 26	5 32	6 52	5 58	6 05	6 26	5 22	6 58	4 54	7 22	4 55
24	7 20	5 24	6 48	5 58	6 08	6 25	5 23	6 53	4 53	7 20	4 49	7 35	5 06	7 25	5 33	6 51	5 59	6 04	6 27	5 21	6 59	4 53	7 23	4 56
25	7 19	5 25	6 47	5 59	6 06	6 26	5 21	6 54	4 53	7 21	4 49	7 35	5 07	7 25	5 33	6 49	6 00	6 02	6 28	5 19	7 00	4 53	7 23	4 56
26	7 19	5 26	6 46	6 00	6 04	6 27	5 20	6 55	4 52	7 21	4 49	7 36	5 08	7 24	5 34	6 48	6 01	6 01	6 29	5 18	7 01	4 52	7 24	4 57
27	7 18	5 28	6 44	6 01	6 03	6 28	5 19	6 56	4 52	7 22	4 50	7 36	5 09	7 23	5 35	6 47	6 01	5 59	6 30	5 17	7 02	4 52	7 24	4 58
28	7 17	5 29	6 43	6 02	6 01	6 29	5 18	6 57	4 51	7 23	4 50	7 36	5 09	7 22	5 36	6 45	6 02	5 58	6 31	5 16	7 03	4 52	7 24	4 58
29	7 16	5 30	6 43	6 03	6 00	6 30	5 17	6 58	4 51	7 24	4 50	7 36	5 10	7 21	5 37	6 44	6 03	5 56	6 32	5 15	7 04	4 52	7 25	4 59
30	7 16	5 31			5 58	6 31	5 15	6 59	4 50	7 24	4 51	7 36	5 11	7 20	5 38	6 42	6 04	5 55	6 33	5 14	7 05	4 51	7 25	5 00
31	7 15	5 32			5 57	6 31			4 50	7 25			5 12	7 19	5 39	6 41			6 34	5 12			7 25	5 01

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SAN JOSE, CALIFORNIA

NO. 1045

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 22	5 01	7 11	5 32	6 39	6 01	5 54	6 30	5 13	6 57	4 49	7 22	4 51	7 32	5 12	7 15	5 38	6 37	6 03	5 51	6 32	5 10	7 03	4 50
2	7 22	5 02	7 10	5 33	6 38	6 02	5 52	6 31	5 12	6 58	4 48	7 23	4 51	7 32	5 13	7 14	5 39	6 35	6 04	5 50	6 33	5 09	7 04	4 50
3	7 22	5 02	7 09	5 34	6 36	6 03	5 51	6 32	5 11	6 59	4 48	7 24	4 52	7 32	5 14	7 13	5 40	6 34	6 05	5 48	6 34	5 08	7 05	4 50
4	7 22	5 03	7 08	5 35	6 35	6 04	5 49	6 33	5 10	7 00	4 48	7 24	4 52	7 32	5 14	7 12	5 40	6 32	6 05	5 47	6 35	5 07	7 06	4 50
5	7 22	5 04	7 08	5 36	6 34	6 05	5 48	6 34	5 09	7 01	4 47	7 25	4 53	7 32	5 15	7 11	5 41	6 31	6 06	5 45	6 36	5 06	7 07	4 50
6	7 22	5 05	7 07	5 38	6 32	6 06	5 46	6 35	5 08	7 01	4 47	7 25	4 53	7 31	5 16	7 10	5 42	6 29	6 07	5 44	6 37	5 05	7 07	4 50
7	7 22	5 06	7 06	5 39	6 31	6 07	5 45	6 35	5 07	7 02	4 47	7 26	4 54	7 31	5 17	7 09	5 43	6 28	6 08	5 42	6 38	5 04	7 08	4 50
8	7 22	5 07	7 05	5 40	6 29	6 08	5 43	6 36	5 06	7 03	4 47	7 27	4 54	7 31	5 18	7 08	5 44	6 26	6 09	5 41	6 39	5 03	7 09	4 50
9	7 22	5 08	7 04	5 41	6 28	6 09	5 42	6 37	5 05	7 04	4 47	7 27	4 55	7 30	5 19	7 07	5 44	6 25	6 10	5 39	6 40	5 02	7 10	4 50
10	7 22	5 09	7 03	5 42	6 26	6 10	5 41	6 38	5 04	7 05	4 47	7 28	4 55	7 30	5 19	7 06	5 45	6 23	6 11	5 38	6 41	5 01	7 11	4 50
11	7 22	5 10	7 01	5 43	6 25	6 11	5 39	6 39	5 03	7 06	4 47	7 28	4 56	7 30	5 20	7 05	5 46	6 22	6 12	5 37	6 42	5 01	7 12	4 50
12	7 22	5 11	7 00	5 44	6 24	6 12	5 38	6 40	5 02	7 07	4 46	7 28	4 57	7 29	5 21	7 04	5 47	6 20	6 13	5 35	6 44	5 00	7 12	4 50
13	7 21	5 12	6 59	5 45	6 22	6 13	5 36	6 41	5 01	7 08	4 46	7 29	4 57	7 29	5 22	7 02	5 48	6 19	6 14	5 34	6 45	4 59	7 13	4 51
14	7 21	5 13	6 58	5 46	6 21	6 14	5 35	6 42	5 00	7 08	4 46	7 29	4 58	7 28	5 23	7 01	5 49	6 17	6 14	5 32	6 46	4 58	7 14	4 51
15	7 21	5 14	6 57	5 47	6 19	6 15	5 33	6 43	4 59	7 09	4 46	7 30	4 59	7 28	5 24	7 00	5 49	6 16	6 15	5 31	6 47	4 58	7 14	4 51
16	7 21	5 15	6 56	5 48	6 18	6 16	5 32	6 43	4 58	7 10	4 47	7 30	4 59	7 27	5 24	6 59	5 50	6 14	6 16	5 30	6 48	4 57	7 15	4 52
17	7 20	5 16	6 55	5 49	6 16	6 17	5 31	6 44	4 57	7 11	4 47	7 30	5 00	7 27	5 25	6 57	5 51	6 13	6 17	5 28	6 49	4 56	7 16	4 52
18	7 20	5 17	6 53	5 50	6 15	6 18	5 29	6 45	4 57	7 12	4 47	7 31	5 01	7 26	5 26	6 56	5 52	6 11	6 18	5 27	6 50	4 56	7 16	4 52
19	7 19	5 18	6 52	5 51	6 13	6 18	5 28	6 46	4 56	7 13	4 47	7 31	5 02	7 26	5 27	6 55	5 53	6 10	6 19	5 26	6 51	4 55	7 17	4 53
20	7 19	5 19	6 51	5 52	6 12	6 19	5 27	6 47	4 55	7 13	4 47	7 31	5 02	7 25	5 28	6 54	5 54	6 08	6 20	5 24	6 52	4 54	7 18	4 53
21	7 18	5 20	6 50	5 53	6 10	6 20	5 25	6 48	4 55	7 14	4 47	7 31	5 03	7 24	5 29	6 52	5 54	6 07	6 21	5 23	6 53	4 54	7 18	4 54
22	7 18	5 21	6 49	5 54	6 09	6 21	5 24	6 49	4 54	7 15	4 47	7 32	5 04	7 24	5 30	6 51	5 55	6 05	6 22	5 22	6 54	4 53	7 19	4 54
23	7 17	5 22	6 47	5 55	6 07	6 22	5 23	6 50	4 53	7 16	4 48	7 32	5 05	7 23	5 30	6 50	5 56	6 03	6 23	5 21	6 55	4 53	7 19	4 55
24	7 17	5 23	6 46	5 57	6 06	6 23	5 22	6 51	4 53	7 17	4 48	7 32	5 05	7 22	5 31	6 48	5 57	6 02	6 24	5 19	6 56	4 52	7 19	4 55
25	7 16	5 24	6 45	5 58	6 04	6 24	5 20	6 52	4 52	7 17	4 48	7 32	5 06	7 22	5 32	6 47	5 58	6 00	6 25	5 18	6 57	4 52	7 20	4 56
26	7 16	5 25	6 43	5 59	6 03	6 25	5 19	6 52	4 51	7 18	4 49	7 32	5 07	7 21	5 33	6 45	5 59	5 59	6 26	5 17	6 58	4 52	7 20	4 56
27	7 15	5 27	6 42	6 00	6 01	6 26	5 18	6 53	4 51	7 19	4 49	7 32	5 08	7 20	5 34	6 44	5 59	5 57	6 27	5 16	6 59	4 51	7 21	4 57
28	7 14	5 28	6 41	6 00	6 00	6 27	5 17	6 54	4 50	7 20	4 49	7 32	5 09	7 19	5 35	6 43	6 00	5 56	6 28	5 15	7 00	4 51	7 21	4 58
29	7 13	5 29	6 40	6 01	5 58	6 27	5 15	6 55	4 50	7 20	4 50	7 32	5 09	7 18	5 35	6 41	6 01	5 54	6 29	5 13	7 01	4 51	7 21	4 58
30	7 13	5 30			5 57	6 28	5 14	6 56	4 50	7 21	4 50	7 32	5 10	7 17	5 36	6 40	6 02	5 53	6 30	5 12	7 02	4 51	7 21	4 59
31	7 12	5 31			5 55	6 29			4 49	7 22			5 11	7 16	5 37	6 38			6 31	5 11			7 22	5 00

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT SANTA MARIA, CALIFORNIA

NO. 1046

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 10	5 01	7 01	5 31	6 32	5 57	5 49	6 23	5 11	6 47	4 49	7 10	4 52	7 19	5 11	7 05	5 34	6 29	5 56	5 46	6 22	5 08	6 51	4 50
2	7 10	5 02	7 00	5 32	6 30	5 58	5 48	6 24	5 10	6 48	4 49	7 11	4 52	7 19	5 12	7 04	5 35	6 27	5 57	5 45	6 23	5 07	6 52	4 50
3	7 10	5 03	6 59	5 33	6 29	5 59	5 46	6 24	5 09	6 48	4 49	7 11	4 52	7 19	5 13	7 03	5 36	6 26	5 58	5 43	6 24	5 06	6 53	4 50
4	7 10	5 04	6 58	5 34	6 28	6 00	5 45	6 25	5 08	6 49	4 48	7 12	4 53	7 19	5 13	7 02	5 36	6 25	5 59	5 42	6 25	5 05	6 54	4 50
5	7 10	5 05	6 58	5 35	6 26	6 01	5 44	6 26	5 07	6 50	4 48	7 12	4 53	7 19	5 14	7 01	5 37	6 23	5 59	5 41	6 26	5 04	6 55	4 50
6	7 10	5 05	6 57	5 36	6 25	6 02	5 42	6 27	5 06	6 51	4 48	7 13	4 54	7 19	5 15	7 00	5 38	6 22	6 00	5 39	6 27	5 03	6 55	4 50
7	7 10	5 06	6 56	5 37	6 24	6 03	5 41	6 28	5 05	6 52	4 48	7 13	4 54	7 19	5 16	6 59	5 39	6 20	6 01	5 38	6 28	5 02	6 56	4 50
8	7 10	5 07	6 55	5 38	6 22	6 03	5 40	6 28	5 04	6 52	4 48	7 14	4 55	7 18	5 16	6 58	5 39	6 19	6 02	5 36	6 29	5 02	6 57	4 50
9	7 10	5 08	6 54	5 39	6 21	6 04	5 38	6 29	5 04	6 53	4 48	7 14	4 55	7 18	5 17	6 57	5 40	6 18	6 03	5 35	6 30	5 01	6 58	4 50
10	7 10	5 09	6 53	5 40	6 20	6 05	5 37	6 30	5 03	6 54	4 48	7 15	4 56	7 18	5 18	6 56	5 41	6 16	6 03	5 34	6 31	5 00	6 59	4 51
11	7 10	5 10	6 52	5 41	6 18	6 06	5 35	6 31	5 02	6 55	4 47	7 15	4 57	7 17	5 19	6 55	5 42	6 15	6 04	5 32	6 32	4 59	6 59	4 51
12	7 10	5 11	6 51	5 42	6 17	6 07	5 34	6 32	5 01	6 56	4 47	7 16	4 57	7 17	5 19	6 54	5 42	6 13	6 05	5 31	6 33	4 59	7 00	4 51
13	7 10	5 12	6 50	5 43	6 16	6 08	5 33	6 32	5 00	6 56	4 47	7 16	4 58	7 17	5 20	6 53	5 43	6 12	6 06	5 30	6 34	4 58	7 01	4 51
14	7 10	5 13	6 49	5 44	6 14	6 08	5 32	6 33	4 59	6 57	4 47	7 17	4 58	7 16	5 21	6 51	5 44	6 10	6 07	5 29	6 35	4 57	7 01	4 52
15	7 09	5 14	6 48	5 45	6 13	6 09	5 30	6 34	4 59	6 58	4 47	7 17	4 59	7 16	5 22	6 50	5 44	6 09	6 07	5 27	6 36	4 57	7 02	4 52
16	7 09	5 15	6 47	5 45	6 11	6 10	5 29	6 35	4 58	6 59	4 48	7 17	5 00	7 15	5 22	6 49	5 45	6 08	6 08	5 26	6 37	4 56	7 03	4 52
17	7 09	5 16	6 46	5 46	6 10	6 11	5 28	6 36	4 57	7 00	4 48	7 18	5 00	7 15	5 23	6 48	5 46	6 06	6 09	5 25	6 38	4 55	7 03	4 52
18	7 08	5 17	6 45	5 47	6 09	6 12	5 26	6 36	4 56	7 00	4 48	7 18	5 01	7 14	5 24	6 47	5 47	6 05	6 10	5 24	6 39	4 55	7 04	4 53
19	7 08	5 17	6 44	5 48	6 07	6 13	5 25	6 37	4 56	7 01	4 48	7 18	5 02	7 14	5 25	6 46	5 47	6 03	6 11	5 22	6 40	4 54	7 05	4 53
20	7 08	5 18	6 42	5 49	6 06	6 13	5 24	6 38	4 55	7 02	4 48	7 18	5 02	7 13	5 25	6 44	5 48	6 02	6 12	5 21	6 41	4 54	7 05	4 54
21	7 07	5 19	6 41	5 50	6 04	6 14	5 23	6 39	4 54	7 03	4 48	7 19	5 03	7 13	5 26	6 43	5 49	6 00	6 13	5 20	6 42	4 53	7 06	4 54
22	7 07	5 20	6 40	5 51	6 03	6 15	5 22	6 40	4 54	7 03	4 49	7 19	5 04	7 12	5 27	6 42	5 50	5 59	6 13	5 19	6 43	4 53	7 06	4 55
23	7 06	5 21	6 39	5 52	6 02	6 16	5 20	6 40	4 53	7 04	4 49	7 19	5 05	7 11	5 28	6 41	5 50	5 58	6 14	5 18	6 44	4 53	7 07	4 55
24	7 06	5 23	6 38	5 53	6 00	6 17	5 19	6 41	4 53	7 05	4 49	7 19	5 05	7 11	5 28	6 39	5 51	5 56	6 15	5 16	6 45	4 52	7 07	4 56
25	7 05	5 24	6 37	5 54	5 59	6 17	5 18	6 42	4 52	7 05	4 49	7 19	5 06	7 10	5 29	6 38	5 52	5 55	6 16	5 15	6 46	4 52	7 07	4 56
26	7 05	5 25	6 35	5 55	5 57	6 18	5 17	6 43	4 52	7 06	4 50	7 19	5 07	7 09	5 30	6 37	5 53	5 53	6 17	5 14	6 46	4 52	7 08	4 57
27	7 04	5 26	6 34	5 56	5 56	6 19	5 16	6 44	4 51	7 07	4 50	7 19	5 07	7 09	5 31	6 35	5 53	5 52	6 18	5 13	6 47	4 51	7 08	4 58
28	7 03	5 27	6 33	5 57	5 55	6 20	5 15	6 44	4 51	7 07	4 50	7 19	5 08	7 08	5 31	6 34	5 54	5 50	6 19	5 12	6 48	4 51	7 09	4 58
29	7 03	5 28	6 33	5 57	5 53	6 21	5 14	6 45	4 50	7 08	4 51	7 19	5 09	7 07	5 32	6 33	5 55	5 49	6 20	5 11	6 49	4 51	7 09	4 59
30	7 02	5 29			5 52	6 21	5 12	6 46	4 50	7 09	4 51	7 19	5 10	7 06	5 33	6 31	5 56	5 48	6 21	5 10	6 50	4 51	7 09	5 00
31	7 01	5 30			5 50	6 22			4 50	7 09			5 10	7 05	5 34	6 30			6 22	5 09			7 09	5 00

SUNRISE AND SUNSET AT STOCKTON, CALIFORNIA

NO. 1047

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 21	4 56	7 10	5 28	6 37	5 58	5 51	6 28	5 09	6 56	4 44	7 22	4 46	7 31	5 08	7 14	5 35	6 35	6 00	5 48	6 30	5 06	7 02	4 46
2	7 21	4 57	7 09	5 29	6 36	5 59	5 49	6 29	5 08	6 56	4 44	7 22	4 47	7 31	5 09	7 13	5 35	6 33	6 01	5 47	6 32	5 05	7 03	4 46
3	7 21	4 58	7 08	5 30	6 34	6 00	5 48	6 30	5 07	6 57	4 44	7 23	4 47	7 31	5 10	7 12	5 36	6 32	6 02	5 45	6 33	5 04	7 04	4 46
4	7 21	4 59	7 07	5 32	6 33	6 01	5 46	6 31	5 06	6 58	4 43	7 24	4 48	7 31	5 10	7 11	5 37	6 30	6 03	5 44	6 34	5 03	7 05	4 46
5	7 21	5 00	7 06	5 33	6 31	6 02	5 45	6 32	5 05	6 59	4 43	7 24	4 48	7 31	5 11	7 10	5 38	6 29	6 04	5 42	6 35	5 02	7 06	4 46
6	7 21	5 01	7 05	5 34	6 30	6 03	5 43	6 32	5 04	7 00	4 43	7 25	4 49	7 31	5 12	7 09	5 39	6 27	6 05	5 41	6 36	5 01	7 07	4 46
7	7 21	5 02	7 04	5 35	6 29	6 04	5 42	6 33	5 03	7 01	4 43	7 25	4 49	7 30	5 13	7 08	5 40	6 26	6 06	5 39	6 37	5 00	7 07	4 46
8	7 21	5 03	7 03	5 36	6 27	6 05	5 40	6 34	5 02	7 02	4 42	7 26	4 50	7 30	5 14	7 07	5 41	6 24	6 07	5 38	6 38	4 59	7 08	4 46
9	7 21	5 04	7 02	5 37	6 26	6 06	5 39	6 35	5 01	7 03	4 42	7 26	4 50	7 30	5 15	7 06	5 41	6 23	6 08	5 36	6 39	4 58	7 09	4 46
10	7 21	5 04	7 01	5 38	6 24	6 07	5 37	6 36	5 00	7 04	4 42	7 27	4 51	7 29	5 16	7 05	5 42	6 21	6 09	5 35	6 40	4 58	7 10	4 46
11	7 21	5 05	7 00	5 39	6 23	6 08	5 36	6 37	4 59	7 05	4 42	7 27	4 52	7 29	5 16	7 03	5 43	6 20	6 10	5 34	6 41	4 57	7 11	4 46
12	7 21	5 06	6 59	5 40	6 21	6 09	5 34	6 38	4 58	7 06	4 42	7 28	4 52	7 29	5 17	7 02	5 44	6 18	6 11	5 32	6 42	4 56	7 12	4 46
13	7 21	5 07	6 58	5 42	6 20	6 10	5 33	6 39	4 57	7 06	4 42	7 28	4 53	7 28	5 18	7 01	5 45	6 16	6 11	5 31	6 43	4 55	7 12	4 46
14	7 20	5 08	6 57	5 43	6 18	6 11	5 32	6 40	4 56	7 07	4 42	7 29	4 54	7 28	5 19	7 00	5 46	6 15	6 12	5 29	6 44	4 54	7 13	4 46
15	7 20	5 10	6 55	5 44	6 17	6 12	5 30	6 41	4 55	7 08	4 42	7 29	4 54	7 27	5 20	6 58	5 47	6 13	6 13	5 28	6 45	4 54	7 14	4 47
16	7 20	5 11	6 54	5 45	6 15	6 13	5 29	6 42	4 54	7 09	4 42	7 29	4 55	7 27	5 21	6 57	5 47	6 12	6 14	5 26	6 47	4 53	7 14	4 47
17	7 19	5 12	6 53	5 46	6 14	6 14	5 27	6 43	4 53	7 10	4 42	7 30	4 56	7 26	5 22	6 56	5 48	6 10	6 15	5 25	6 48	4 52	7 15	4 47
18	7 19	5 13	6 52	5 47	6 12	6 15	5 26	6 44	4 53	7 11	4 42	7 30	4 57	7 25	5 23	6 55	5 49	6 09	6 16	5 24	6 49	4 52	7 16	4 48
19	7 18	5 14	6 50	5 48	6 11	6 16	5 25	6 44	4 52	7 12	4 42	7 30	4 57	7 25	5 23	6 53	5 50	6 07	6 17	5 22	6 50	4 51	7 16	4 48
20	7 18	5 15	6 49	5 49	6 09	6 17	5 23	6 45	4 51	7 12	4 42	7 31	4 58	7 24	5 24	6 52	5 51	6 06	6 18	5 21	6 51	4 50	7 17	4 49
21	7 17	5 16	6 48	5 50	6 08	6 18	5 22	6 46	4 50	7 13	4 43	7 31	4 59	7 24	5 25	6 51	5 52	6 04	6 19	5 20	6 52	4 50	7 17	4 49
22	7 17	5 17	6 47	5 51	6 06	6 19	5 21	6 47	4 50	7 14	4 43	7 31	5 00	7 23	5 26	6 49	5 53	6 02	6 20	5 18	6 53	4 49	7 18	4 50
23	7 16	5 18	6 45	5 52	6 04	6 20	5 19	6 48	4 49	7 15	4 43	7 31	5 00	7 22	5 27	6 48	5 53	6 01	6 21	5 17	6 54	4 49	7 18	4 50
24	7 16	5 19	6 44	5 53	6 03	6 21	5 18	6 49	4 48	7 16	4 43	7 31	5 01	7 21	5 28	6 46	5 54	5 59	6 22	5 16	6 55	4 48	7 19	4 51
25	7 15	5 20	6 43	5 54	6 01	6 21	5 17	6 50	4 48	7 16	4 44	7 31	5 02	7 21	5 29	6 45	5 55	5 58	6 23	5 15	6 56	4 48	7 19	4 51
26	7 14	5 21	6 41	5 55	6 00	6 22	5 15	6 51	4 47	7 17	4 44	7 31	5 03	7 20	5 29	6 44	5 56	5 56	6 24	5 13	6 57	4 47	7 19	4 52
27	7 14	5 23	6 40	5 56	5 58	6 23	5 14	6 52	4 47	7 18	4 44	7 31	5 04	7 19	5 30	6 42	5 57	5 55	6 25	5 12	6 58	4 47	7 20	4 53
28	7 13	5 24	6 39	5 57	5 57	6 24	5 13	6 53	4 46	7 19	4 45	7 32	5 04	7 18	5 31	6 41	5 58	5 53	6 26	5 11	6 59	4 47	7 20	4 53
29	7 12	5 25	6 38	5 58	5 55	6 25	5 12	6 54	4 46	7 19	4 45	7 32	5 05	7 17	5 32	6 39	5 59	5 52	6 27	5 10	7 00	4 47	7 20	4 54
30	7 11	5 26			5 54	6 26	5 10	6 55	4 45	7 20	4 46	7 31	5 06	7 16	5 33	6 38	6 00	5 50	6 28	5 09	7 01	4 46	7 21	4 55
31	7 11	5 27			5 52	6 27			4 45	7 21			5 07	7 15	5 34	6 36			6 29	5 08			7 21	4 55

Add one hour for Daylight Saving Time if and when in use.

SUNRISE AND SUNSET AT MEDFORD, OREGON

NO. 1237

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 41	4 49	7 25	5 25	6 47	6 01	5 54	6 37	5 07	7 11	4 37	7 42	4 38	7 52	5 04	7 31	5 36	6 46	6 08	5 53	6 45	5 05	7 21	4 40
2	7 41	4 50	7 24	5 27	6 46	6 02	5 53	6 38	5 06	7 12	4 37	7 42	4 39	7 52	5 05	7 30	5 37	6 44	6 09	5 52	6 46	5 04	7 22	4 40
3	7 41	4 51	7 23	5 28	6 44	6 04	5 51	6 39	5 04	7 13	4 36	7 43	4 39	7 52	5 06	7 29	5 38	6 42	6 10	5 50	6 47	5 03	7 23	4 39
4	7 41	4 52	7 22	5 29	6 42	6 05	5 49	6 40	5 03	7 14	4 36	7 44	4 40	7 51	5 07	7 28	5 39	6 41	6 12	5 48	6 48	5 01	7 24	4 39
5	7 41	4 53	7 21	5 31	6 41	6 06	5 48	6 42	5 02	7 15	4 36	7 44	4 40	7 51	5 08	7 26	5 40	6 39	6 13	5 46	6 50	5 00	7 25	4 39
6	7 41	4 54	7 20	5 32	6 39	6 07	5 46	6 43	5 00	7 16	4 35	7 45	4 41	7 51	5 09	7 25	5 42	6 37	6 14	5 45	6 51	4 59	7 26	4 39
7	7 41	4 55	7 19	5 33	6 37	6 08	5 44	6 44	4 59	7 17	4 35	7 46	4 42	7 51	5 10	7 24	5 43	6 36	6 15	5 43	6 52	4 58	7 27	4 39
8	7 41	4 56	7 17	5 35	6 36	6 10	5 42	6 45	4 58	7 18	4 35	7 46	4 42	7 50	5 11	7 23	5 44	6 34	6 16	5 41	6 53	4 57	7 28	4 39
9	7 40	4 57	7 16	5 36	6 34	6 11	5 41	6 46	4 57	7 20	4 34	7 47	4 43	7 50	5 12	7 21	5 45	6 32	6 17	5 40	6 55	4 56	7 29	4 39
10	7 40	4 58	7 15	5 37	6 32	6 12	5 39	6 47	4 56	7 21	4 34	7 48	4 44	7 49	5 13	7 20	5 46	6 30	6 18	5 38	6 56	4 55	7 30	4 39
11	7 40	4 59	7 14	5 38	6 31	6 13	5 37	6 48	4 54	7 22	4 34	7 48	4 44	7 49	5 14	7 19	5 47	6 29	6 19	5 36	6 57	4 54	7 30	4 39
12	7 40	5 01	7 12	5 40	6 29	6 14	5 36	6 49	4 53	7 23	4 34	7 49	4 45	7 48	5 15	7 17	5 48	6 27	6 21	5 35	6 58	4 53	7 31	4 39
13	7 39	5 02	7 11	5 41	6 27	6 15	5 34	6 51	4 52	7 24	4 34	7 49	4 46	7 48	5 16	7 16	5 49	6 25	6 22	5 33	7 00	4 52	7 32	4 39
14	7 39	5 03	7 10	5 42	6 26	6 17	5 33	6 52	4 51	7 25	4 34	7 50	4 47	7 47	5 17	7 14	5 50	6 23	6 23	5 31	7 01	4 51	7 33	4 39
15	7 38	5 04	7 08	5 44	6 24	6 18	5 31	6 53	4 50	7 26	4 34	7 50	4 48	7 47	5 18	7 13	5 51	6 22	6 24	5 30	7 02	4 50	7 34	4 40
16	7 38	5 05	7 07	5 45	6 22	6 19	5 29	6 54	4 49	7 27	4 34	7 50	4 48	7 46	5 19	7 11	5 52	6 20	6 25	5 28	7 03	4 49	7 34	4 40
17	7 37	5 06	7 06	5 46	6 20	6 20	5 28	6 55	4 48	7 28	4 34	7 51	4 49	7 45	5 20	7 10	5 53	6 18	6 26	5 27	7 05	4 48	7 35	4 40
18	7 37	5 08	7 04	5 47	6 19	6 21	5 26	6 56	4 47	7 29	4 34	7 51	4 50	7 45	5 21	7 08	5 54	6 16	6 28	5 25	7 06	4 47	7 36	4 41
19	7 36	5 09	7 03	5 49	6 17	6 22	5 25	6 57	4 46	7 30	4 34	7 51	4 51	7 44	5 22	7 07	5 55	6 14	6 29	5 24	7 07	4 46	7 36	4 41
20	7 36	5 10	7 01	5 50	6 15	6 23	5 23	6 58	4 45	7 31	4 34	7 52	4 52	7 43	5 24	7 05	5 56	6 13	6 30	5 22	7 08	4 46	7 37	4 41
21	7 35	5 11	7 00	5 51	6 14	6 25	5 21	7 00	4 45	7 32	4 34	7 52	4 53	7 42	5 25	7 04	5 57	6 11	6 31	5 21	7 09	4 45	7 37	4 42
22	7 34	5 12	6 58	5 52	6 12	6 26	5 20	7 01	4 44	7 33	4 35	7 52	4 54	7 41	5 26	7 02	5 58	6 09	6 32	5 19	7 11	4 44	7 38	4 42
23	7 33	5 14	6 57	5 54	6 10	6 27	5 18	7 02	4 43	7 34	4 35	7 52	4 55	7 40	5 27	7 01	6 00	6 07	6 34	5 18	7 12	4 44	7 38	4 43
24	7 33	5 15	6 55	5 55	6 08	6 28	5 17	7 03	4 42	7 35	4 35	7 52	4 56	7 40	5 28	6 59	6 01	6 06	6 35	5 16	7 13	4 43	7 39	4 43
25	7 32	5 16	6 54	5 56	6 07	6 29	5 15	7 04	4 41	7 36	4 36	7 52	4 57	7 39	5 29	6 57	6 02	6 04	6 36	5 15	7 14	4 43	7 39	4 44
26	7 31	5 18	6 52	5 57	6 05	6 30	5 14	7 05	4 41	7 37	4 36	7 52	4 58	7 38	5 30	6 56	6 03	6 02	6 37	5 13	7 15	4 42	7 40	4 45
27	7 30	5 19	6 51	5 59	6 03	6 31	5 13	7 06	4 40	7 37	4 36	7 52	4 59	7 37	5 31	6 54	6 04	6 00	6 38	5 12	7 16	4 41	7 40	4 45
28	7 29	5 20	6 49	6 00	6 01	6 33	5 11	7 07	4 39	7 38	4 37	7 52	5 00	7 36	5 32	6 53	6 05	5 59	6 40	5 10	7 18	4 41	7 40	4 46
29	7 28	5 21	6 48	6 01	6 00	6 34	5 10	7 09	4 39	7 39	4 37	7 52	5 01	7 35	5 33	6 51	6 06	5 57	6 41	5 09	7 19	4 41	7 40	4 47
30	7 27	5 23			5 58	6 35	5 08	7 10	4 38	7 40	4 38	7 52	5 02	7 33	5 34	6 49	6 07	5 55	6 42	5 08	7 20	4 40	7 41	4 48
31	7 26	5 24			5 56	6 36			4 38	7 41			5 03	7 32	5 35	6 48			6 43	5 06			7 41	4 48

Add one hour for Daylight Saving Time if and when in use.

TABLE 10 (Contd.)

SUNRISE AND SUNSET AT RENO, NEVADA

NO. 1185

PACIFIC STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 20	4 46	7 07	5 19	6 32	5 51	5 44	6 23	5 00	6 53	4 34	7 20	4 35	7 30	4 58	7 12	5 27	6 30	5 55	5 42	6 27	4 58	7 00	4 36
2	7 20	4 47	7 06	5 20	6 31	5 52	5 42	6 24	4 59	6 54	4 33	7 21	4 36	7 30	4 59	7 11	5 28	6 29	5 56	5 40	6 28	4 57	7 01	4 36
3	7 20	4 48	7 05	5 22	6 30	5 53	5 41	6 25	4 58	6 55	4 33	7 22	4 36	7 30	5 00	7 10	5 29	6 27	5 57	5 39	6 29	4 56	7 02	4 36
4	7 20	4 49	7 04	5 23	6 28	5 54	5 39	6 26	4 57	6 56	4 33	7 22	4 37	7 30	5 01	7 09	5 30	6 26	5 58	5 37	6 30	4 55	7 03	4 35
5	7 20	4 50	7 03	5 24	6 27	5 55	5 38	6 27	4 56	6 57	4 32	7 23	4 37	7 30	5 02	7 08	5 31	6 24	5 59	5 36	6 32	4 53	7 04	4 35
6	7 20	4 50	7 02	5 25	6 25	5 57	5 36	6 28	4 55	6 57	4 32	7 23	4 38	7 29	5 03	7 06	5 32	6 23	6 00	5 34	6 33	4 52	7 05	4 35
7	7 20	4 51	7 01	5 26	6 23	5 58	5 34	6 29	4 53	6 58	4 32	7 24	4 39	7 29	5 04	7 05	5 33	6 21	6 01	5 33	6 34	4 51	7 06	4 35
8	7 20	4 52	7 00	5 27	6 22	5 59	5 33	6 30	4 52	6 59	4 32	7 25	4 39	7 29	5 05	7 04	5 34	6 19	6 02	5 31	6 35	4 50	7 07	4 35
9	7 20	4 53	6 59	5 29	6 20	6 00	5 31	6 31	4 51	7 00	4 32	7 25	4 40	7 28	5 06	7 03	5 34	6 18	6 03	5 29	6 36	4 49	7 08	4 35
10	7 19	4 54	6 58	5 30	6 19	6 01	5 30	6 32	4 50	7 01	4 31	7 26	4 40	7 28	5 07	7 02	5 35	6 16	6 04	5 28	6 37	4 48	7 08	4 35
11	7 19	4 55	6 56	5 31	6 17	6 02	5 28	6 33	4 49	7 02	4 31	7 26	4 41	7 28	5 08	7 00	5 36	6 15	6 05	5 26	6 38	4 48	7 09	4 35
12	7 19	4 56	6 55	5 32	6 16	6 03	5 27	6 34	4 48	7 03	4 31	7 27	4 42	7 27	5 08	6 59	5 37	6 13	6 06	5 25	6 40	4 47	7 10	4 36
13	7 19	4 57	6 54	5 33	6 14	6 04	5 25	6 35	4 47	7 04	4 31	7 27	4 43	7 27	5 09	6 58	5 38	6 11	6 07	5 23	6 41	4 46	7 11	4 36
14	7 18	4 58	6 53	5 34	6 13	6 05	5 24	6 36	4 46	7 05	4 31	7 28	4 43	7 26	5 10	6 57	5 39	6 10	6 08	5 22	6 42	4 45	7 12	4 36
15	7 18	5 00	6 52	5 36	6 11	6 06	5 22	6 37	4 45	7 06	4 31	7 28	4 44	7 26	5 11	6 55	5 40	6 08	6 09	5 20	6 43	4 44	7 12	4 36
16	7 18	5 01	6 50	5 37	6 09	6 07	5 21	6 38	4 44	7 07	4 31	7 28	4 45	7 25	5 12	6 54	5 41	6 06	6 10	5 19	6 44	4 43	7 13	4 37
17	7 17	5 02	6 49	5 38	6 08	6 08	5 19	6 39	4 44	7 08	4 31	7 29	4 46	7 24	5 13	6 53	5 42	6 05	6 11	5 18	6 45	4 43	7 14	4 37
18	7 17	5 03	6 48	5 39	6 06	6 09	5 18	6 40	4 43	7 09	4 31	7 29	4 46	7 24	5 14	6 51	5 43	6 03	6 12	5 16	6 46	4 42	7 14	4 37
19	7 16	5 04	6 46	5 40	6 05	6 10	5 17	6 41	4 42	7 10	4 32	7 29	4 47	7 23	5 15	6 50	5 44	6 02	6 13	5 15	6 47	4 41	7 15	4 38
20	7 16	5 05	6 45	5 41	6 03	6 11	5 15	6 42	4 41	7 11	4 32	7 29	4 48	7 22	5 16	6 48	5 45	6 00	6 14	5 13	6 49	4 41	7 15	4 38
21	7 15	5 06	6 44	5 42	6 01	6 12	5 14	6 43	4 40	7 11	4 32	7 30	4 49	7 22	5 17	6 47	5 46	5 58	6 15	5 12	6 50	4 40	7 16	4 39
22	7 15	5 07	6 42	5 44	6 00	6 13	5 12	6 44	4 40	7 12	4 32	7 30	4 50	7 21	5 18	6 45	5 46	5 57	6 16	5 11	6 51	4 40	7 16	4 39
23	7 14	5 09	6 41	5 45	5 58	6 14	5 11	6 45	4 39	7 13	4 32	7 30	4 50	7 20	5 19	6 44	5 47	5 55	6 17	5 09	6 52	4 39	7 17	4 40
24	7 13	5 10	6 40	5 46	5 57	6 15	5 10	6 46	4 38	7 14	4 33	7 30	4 51	7 19	5 20	6 43	5 48	5 53	6 18	5 08	6 53	4 38	7 17	4 40
25	7 13	5 11	6 38	5 47	5 55	6 16	5 08	6 47	4 38	7 15	4 33	7 30	4 52	7 18	5 21	6 41	5 49	5 52	6 19	5 07	6 54	4 38	7 18	4 41
26	7 12	5 12	6 37	5 48	5 53	6 17	5 07	6 48	4 37	7 16	4 33	7 30	4 53	7 18	5 22	6 40	5 50	5 50	6 21	5 05	6 55	4 38	7 18	4 41
27	7 11	5 13	6 35	5 49	5 52	6 18	5 06	6 49	4 36	7 16	4 34	7 30	4 54	7 17	5 22	6 38	5 51	5 48	6 22	5 04	6 56	4 37	7 18	4 42
28	7 10	5 14	6 34	5 50	5 50	6 19	5 04	6 50	4 36	7 17	4 34	7 30	4 55	7 16	5 23	6 37	5 52	5 47	6 23	5 03	6 57	4 37	7 19	4 43
29	7 10	5 16	6 33	5 51	5 49	6 20	5 03	6 51	4 35	7 18	4 34	7 30	4 56	7 15	5 24	6 35	5 53	5 45	6 24	5 01	6 58	4 36	7 19	4 44
30	7 09	5 17			5 47	6 21	5 02	6 52	4 35	7 19	4 35	7 30	4 57	7 14	5 25	6 34	5 54	5 44	6 25	5 00	6 59	4 36	7 19	4 44
31	7 08	5 18			5 45	6 22			4 34	7 19			4 57	7 13	5 26	6 32			6 26	4 59			7 19	4 45

Add one hour for Daylight Saving Time if and when in use.

TABLE 10 (Contd.)

SUNRISE AND SUNSET AT YUMA, ARIZONA

NO. 1025

MOUNTAIN STANDARD TIME

DAY	JAN.		FEB.		MAR.		APR.		MAY		JUNE		JULY		AUG.		SEPT.		OCT.		NOV.		DEC.	
	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.	Rise A.M.	Set P.M.
1	7 41	5 44	7 33	6 11	7 07	6 36	6 27	6 58	5 52	7 20	5 31	7 41	5 34	7 50	5 52	7 37	6 13	7 03	6 32	6 23	6 56	5 48	7 22	5 32
2	7 41	5 44	7 33	6 12	7 05	6 36	6 26	6 59	5 51	7 20	5 31	7 42	5 34	7 50	5 53	7 36	6 14	7 02	6 33	6 22	6 57	5 47	7 23	5 32
3	7 41	5 45	7 32	6 13	7 04	6 37	6 24	7 00	5 50	7 21	5 31	7 42	5 35	7 50	5 53	7 35	6 14	7 01	6 34	6 21	6 58	5 46	7 24	5 32
4	7 41	5 46	7 31	6 14	7 03	6 38	6 23	7 00	5 49	7 22	5 31	7 43	5 35	7 50	5 54	7 34	6 15	6 59	6 34	6 19	6 58	5 45	7 25	5 32
5	7 41	5 47	7 30	6 15	7 02	6 39	6 22	7 01	5 48	7 23	5 31	7 43	5 36	7 50	5 55	7 33	6 15	6 58	6 35	6 18	6 59	5 44	7 26	5 32
6	7 41	5 47	7 30	6 16	7 00	6 39	6 20	7 02	5 47	7 23	5 30	7 44	5 36	7 50	5 56	7 32	6 16	6 57	6 36	6 17	7 00	5 44	7 27	5 32
7	7 41	5 48	7 29	6 17	6 59	6 40	6 19	7 03	5 46	7 24	5 30	7 44	5 37	7 49	5 56	7 32	6 17	6 56	6 36	6 16	7 01	5 43	7 27	5 32
8	7 42	5 49	7 28	6 18	6 58	6 41	6 18	7 03	5 45	7 25	5 30	7 45	5 37	7 49	5 57	7 31	6 17	6 54	6 37	6 14	7 02	5 42	7 28	5 32
9	7 41	5 50	7 27	6 19	6 57	6 42	6 17	7 04	5 44	7 26	5 30	7 45	5 38	7 49	5 58	7 30	6 18	6 53	6 38	6 13	7 03	5 41	7 29	5 33
10	7 41	5 51	7 26	6 19	6 55	6 43	6 15	7 05	5 44	7 26	5 30	7 46	5 38	7 49	5 58	7 29	6 19	6 52	6 39	6 12	7 04	5 41	7 30	5 33
11	7 41	5 52	7 25	6 20	6 54	6 43	6 14	7 05	5 43	7 27	5 30	7 46	5 39	7 48	5 59	7 28	6 19	6 50	6 39	6 11	7 05	5 40	7 30	5 33
12	7 41	5 52	7 25	6 21	6 53	6 44	6 13	7 06	5 42	7 28	5 30	7 46	5 39	7 48	6 00	7 27	6 20	6 49	6 40	6 09	7 05	5 39	7 31	5 33
13	7 41	5 53	7 24	6 22	6 52	6 45	6 12	7 07	5 41	7 28	5 30	7 47	5 40	7 48	6 00	7 26	6 21	6 48	6 41	6 08	7 06	5 39	7 32	5 33
14	7 41	5 54	7 23	6 23	6 50	6 45	6 10	7 07	5 41	7 29	5 30	7 47	5 41	7 47	6 01	7 25	6 21	6 46	6 41	6 07	7 07	5 38	7 32	5 34
15	7 41	5 55	7 22	6 24	6 49	6 46	6 09	7 08	5 40	7 30	5 30	7 48	5 41	7 47	6 02	7 23	6 22	6 45	6 42	6 06	7 08	5 38	7 33	5 34
16	7 41	5 56	7 21	6 25	6 48	6 47	6 08	7 09	5 39	7 31	5 30	7 48	5 42	7 47	6 02	7 22	6 22	6 44	6 43	6 05	7 09	5 37	7 34	5 34
17	7 40	5 57	7 20	6 26	6 46	6 48	6 07	7 10	5 38	7 31	5 30	7 48	5 42	7 46	6 03	7 21	6 23	6 42	6 44	6 03	7 10	5 36	7 34	5 35
18	7 40	5 58	7 19	6 26	6 45	6 48	6 06	7 10	5 38	7 32	5 30	7 48	5 43	7 46	6 04	7 20	6 24	6 41	6 44	6 02	7 11	5 36	7 35	5 35
19	7 40	5 59	7 18	6 27	6 44	6 49	6 05	7 11	5 37	7 33	5 31	7 49	5 44	7 45	6 04	7 19	6 24	6 39	6 45	6 01	7 12	5 36	7 35	5 36
20	7 39	6 00	7 17	6 28	6 43	6 50	6 03	7 12	5 37	7 33	5 31	7 49	5 44	7 45	6 05	7 18	6 25	6 38	6 46	6 00	7 13	5 35	7 36	5 36
21	7 39	6 01	7 16	6 29	6 41	6 51	6 02	7 12	5 36	7 34	5 31	7 49	5 45	7 44	6 06	7 17	6 26	6 37	6 47	5 59	7 14	5 35	7 37	5 37
22	7 39	6 02	7 14	6 30	6 40	6 51	6 01	7 13	5 36	7 35	5 31	7 49	5 45	7 44	6 06	7 16	6 26	6 35	6 48	5 58	7 15	5 34	7 37	5 37
23	7 38	6 03	7 13	6 31	6 39	6 52	6 00	7 14	5 35	7 35	5 31	7 50	5 46	7 43	6 07	7 14	6 27	6 34	6 48	5 57	7 15	5 34	7 37	5 38
24	7 38	6 04	7 12	6 32	6 37	6 53	5 59	7 15	5 35	7 36	5 32	7 50	5 47	7 42	6 08	7 13	6 28	6 33	6 49	5 56	7 16	5 34	7 38	5 38
25	7 37	6 05	7 11	6 32	6 36	6 53	5 58	7 15	5 34	7 37	5 32	7 50	5 47	7 42	6 08	7 12	6 28	6 31	6 50	5 55	7 17	5 33	7 38	5 39
26	7 37	6 05	7 10	6 33	6 35	6 54	5 57	7 16	5 34	7 37	5 32	7 50	5 48	7 41	6 09	7 11	6 29	6 30	6 51	5 54	7 18	5 33	7 39	5 39
27	7 36	6 06	7 09	6 34	6 33	6 55	5 56	7 17	5 33	7 38	5 33	7 50	5 49	7 40	6 10	7 10	6 30	6 29	6 52	5 53	7 19	5 33	7 39	5 40
28	7 36	6 07	7 08	6 35	6 32	6 55	5 55	7 18	5 33	7 39	5 33	7 50	5 49	7 40	6 10	7 08	6 30	6 27	6 52	5 52	7 20	5 33	7 40	5 41
29	7 35	6 08	7 08	6 36	6 31	6 56	5 54	7 18	5 32	7 39	5 33	7 50	5 50	7 39	6 11	7 07	6 31	6 26	6 53	5 51	7 21	5 33	7 40	5 41
30	7 35	6 09			6 29	6 57	5 53	7 19	5 32	7 40	5 34	7 50	5 51	7 38	6 12	7 06	6 32	6 25	6 54	5 50	7 22	5 32	7 40	5 42
31	7 34	6 10			6 28	6 58			5 32	7 40			5 51	7 38	6 12	7 05			6 55	5 49			7 40	5 43

Add one hour for Daylight Saving Time if and when in use.

APPENDIX A

GLOSSARY OF SOLAR RADIATION TERMINOLOGY

The source for this glossary is: Listing of Solar Radiation Measuring Equipment and Glossary, E. A. Carter, S. A. Greenbaum, and A. M. Patel; University of Alabama, Center for Environmental and Energy Studies, Huntsville, Alabama, July 1976.

The glossary contains definitions of all important terms likely to be found in the "literature" of solar radiation. The definitions have been extracted from prominent references on meteorological instrumentation and were selected on the basis of clarity and general usage. In some cases, however, the definitions for certain terms may differ from those used in other disciplines; for example, the term "air mass" has a different meaning in meteorology. Also, all authorities are not in complete agreement on certain of these definitions.

Most of the glossary entries contain abbreviated citations to the following four references:

Citation	Refers to
AMS-'59	Glossary of Meteorology, American Meteorological Society. Edited by Ralph E. Huschke
Franklyn-'75	Introduction to Meteorology, Wiley, Franklyn, and Cole.
IMV-'66	International Meteorological Vocabulary, WMO/OMM/BMO No. 182
WMO-'71	Guide to Meteorological Instrument and Observing Practices, WMO No. 8, TP. 3

APPENDIX A
GLOSSARY OF SOLAR RADIATION TERMS

ABSORPTION

The process in which incident radiant energy is retained by a substance. A further process always results from absorption: that is, the irreversible conversion of the absorbed radiation into some other form of energy within and according to the nature of the absorbing medium. The absorbing medium itself may emit radiation, but only after an energy conversion has occurred. (AMS - '59)

ABSORPTION COEFFICIENT

1. A measure of the amount of normally incident radiant energy absorbed through a unit distance or by a unit mass of absorbing medium. (AMS - '59)

2. Quantity k_λ in the equation

$$I_\lambda = I_{\lambda_o} e^{-k_\lambda x}$$

for the radiant flux I_λ of radiation of wavelength λ, initially radiant flux of I_{λ_o} after passing through a thickness x of an absorbing medium is called absorption coefficient. (IMV - '66)

ABSORPTIVITY (called ABSORPTION FACTOR: infrequently called ABSORPTIVE POWER)

A measure of the amount of radiant energy absorbed by a given substance of definite dimensions; defined as the ratio of the amount of radiant energy absorbed to the total amount incident upon the substance.

The absorptivity of any actual substance is a function of temperature as well as wavelength. For a nonopaque substance, it is also a function of the thickness of the substance. (AMS - '59)

ACTINOGRAPH

Instrument for recording the total radiation falling from a small solid angle on a plane surface perpendicular to the axis of the solid angle. It is mainly used to record direct solar radiation.

ACTINOMETER

The general name for any instrument used to measure the intensity of radiant energy, particularly that of the sun (AMS - '59)

ACTINOMETRY

Branch of physics devoted to the study and measurement of radiation; especially in meteorology, solar, atmospheric and terrestrial radiation. (IMV - '66)

AIR

Mixture of gases which composes the earth's atmosphere. (FRANKLYN - '75)

AIR TEMPERATURE

Temperature read on a thermometer which is exposed to the air in a position sheltered from direct solar radiation. (IMV - '66)

ALBEDO

Ratio of the radiation reflected by a surface to that incident on it. (IMV - '66)

ALBEDOMETER

General name for an instrument used to measure the ratio of the radiation reflected by a surface to that incident on it.

ANGLE OF INCIDENCE

The angle at which a ray of energy impinges upon a surface, measured between the direction of propagation of the energy and a perpendicular to the surface at the point of impingement, or incidence. (AMS - '59)

ANGLE OF REFLECTION

The angle at which a reflected ray of energy leaves a reflecting surface, measured between the direction of the outgoing ray and a perpendicular to the surface at the point of reflection. (AMS - '59)

ANGLE OF REFRACTION

The angle at which a refracted ray of energy leaves the interface at which the refraction occurred, measured between the direction of the refracted ray and a perpendicular to the interface at the point of refraction. (AMS - '59)

ATMOSPHERIC RADIATION

The part of terrestrial radiation which is emitted by the atmosphere. (IMV - '66)

ATTENUATION OF SOLAR RADIATION

Loss of energy suffered by a beam of radiant energy which traverses the earth's atmosphere. Losses are caused by scattering by air molecules, by selective absorption by certain molecules, and by absorption and scattering by aerosols. (IMV - '66)

AUREOLE

Name given to that exterior ring in a series which is nearest the luminary in a solar corona, and is usually quite distinct. It is reddish or chestnut in hue and, as a rule, less than 5° radius.

AZIMUTH

The length of the arc of the horizon (in degrees) intercepted between a given point and an adopted reference direction, usually true north, and measured clockwise from the reference direction. (AMS - '59)

BEAM

A ray or collection of focused rays of radiated energy. (AMS - '59)

BLACK BODY

A hypothetical "body" which absorbs completely all incident radiation, independent of wave length and direction; that is, one which neither reflects nor transmits any of the incident radiation. It is the emitter of electromagnetic radiation which, at a given temperature, presents the maximum spectral density of radiant emittance. (IMV - '66 & AMS - '59)

BLACK BODY RADIATION

Theoretical maximum amount of electromagnetic radiation of all wave lengths which may be emitted per unit area of a body at a given temperature. (IMV - '66)

BOLOMETER

Instrument for measuring the intensity of radiant energy. Its principle is based on the variation of electrical resistance, with the incoming radiation, of one or both the metallic strips which the instrument comprises. (IMV - '66)

CALORIMETER

An instrument designed to measure quantities of heat; sometimes used in meteorology to measure solar radiation. (AMS - '59)

CIRCUMSOLAR RADIATION

Radiation scattered by the atmosphere into the area of the sky immediately adjacent to the sun. It causes the solar aureole, and its areal extent is directly related to the atmospheric turbidity, being greater with higher turbidity.

CLOUD COVER (also called CLOUDINESS, CLOUDAGE)

That portion of the sky cover which is attributed to clouds, usually measured in tenths of sky covered. (AMC - '59)

COMPENSATED PYREHLIOMETER

Pyrheliometer based on the comparison of the heating of two identical metal strips, one exposed to a radiation, the other to a joule effect. (IMV - '66)

CONDUCTION

A heat-transfer process by molecular action but not involving molecular transport. (FRANKLYN - '75)

CONVECTION

Organized internal motions within a layer of air, leading to vertical transport of heat is called convection.

*Convection caused by density differences within the air is called free convection.

*Convection caused by mechanical forces such as those arising from air motion over a rough or sloping surface is called a forced convection.

COOLING DEGREE-DAY

Form of degree-day used to estimate the energy requirements for air conditioning or refrigeration. One cooling degree-day is counted for each degree that the daily mean temperature is higher than a base temperature. (IMV - '66)

CORPUSCULAR RADIATION

Radiation composed of particles. (IMV - '66)

COSMIC RADIATION

Radiation, of very high energy and great penetrative power, which emanates from cosmic regions. (IMV - '66)

DEGREE-DAY

Generally, a measure of the departure of the mean daily temperature from a given standard: one degree day for each degree (°C or °F) of departure above (or below) the standard during one day. (AMS - '59)

DIFFUSE SOLAR RADIATION-SKY RADIATION

Downward scattered and reflected solar radiation, coming from the whole hemisphere with the exception of the solid angle subtended by the sun's disc. (IMV - '66)

DIRECT SOLAR RADIATION

Solar radiation coming from the solid angle of the sun's disc on a surface perpendicular to the axis of this cone, comprising mainly unscattered and unreflected solar radiation. (IMV - '66)

DOWNWARD (TOTAL) RADIATION

Solar and terrestrial radiations directed downwards (towards the earth's surface). (IMV - '66)

EFFECTIVE NOCTURNAL RADIATION

1. Radiation balance of a horizontal upward-facing black surface at the ambient air temperature, in the absence of solar radiation.

2. Radiation balance of a horizontal downward-facing black surface at the ambient air temperature.

3. Radiation balance of a horizontal downward-facing black surface at the ambient air temperature in the absence of solar radiation. (IMV - '66)

EFFECTIVE RADIATION

Radiation balance of a horizontal upward-facing black surface at the ambient air temperature. (IMV - '66)

EXTRA-TERRESTRIAL RADIATION

Solar radiation received at the limit of the earth's atmosphere. (IMV - '66)

GLOBAL SOLAR RADIATION

Global solar radiation received on a horizontal surface direct from the solid angle of the sun's disk and also radiation that has been scattered or diffusely reflected in traversing the atmosphere. (WMO - '71)

HEATING DEGREE-DAY

Form of degree-day used as indication of fuel consumption. One heating degree-day is counted for each degree that the daily mean temperature is lower than a base temperature.

INFRARED RADIATION

Radiation with wave lengths higher than about 0.8 micron, and less than 1 millimeter.

INSOLATION

1. Amount of direct solar radiation incident per unit horizontal area at a given level.

2. Downward-directed solar radiation. (IMV - '66)

INSOLATION DURATION

Three kinds are distinguished:

1. Bright sunshine duration: time interval during which solar radiation reaches adequate intensity to cast distinct shadows.

2. Geographically or topographically possible sunshine duration: maximum interval during which solar radiation can reach a given surface.

3. Maximum possible solar duration: interval of time between rising and setting of the upper limb of the sun. (IMV - '66)

INTERNATIONAL PYRHELIOMETRIC SCALE

Pyrheliometric scale decreed as being in operation from July 1, 1957, in order to meet an urgent need for a single international scale. (IMV - '66)

ISOHEL

Curve of equal sunshine duration during a given interval of time. (IMV - '66)

ISOTROPIC RADIATION

Diffuse solar radiation which has the same intensity in all directions. (IMV - '66)

IRRADIANCE (FLUX OF RADIATION PER UNIT AREA)

(at a point on a surface)
Quotient of the flux of radiation incident on an infinitesimal element of a surface containing the point under consideration, by the area of that element. (IMV - '66)

IRRADIATION

(at a point on a surface)
Product of an irradiance and its duration. (IMV - '66)

LONG-WAVE RADIATION

Radiation with wave lengths greater than four microns. (IMV - '66)

LUCIMETER

Instrument for measuring the mean intensity of solar global radiation (direct and diffuse) near the earth's surface in a specified time interval. (IMV - '66)

NET PYRENOMETER

A net pyranometer is an instrument for measuring the difference of the solar radiation falling on both sides of a horizontal surface from the whole hemisphere.

NET PYRGEOMETER

Instrument for measuring the difference of the atmospheric radiation falling on both sides of a horizontal surface at the ambient air temperature.

NET PYRRADIOMETER

Instrument for the measurement of the net flux of downward and upward total (solar, terrestrial surface and atmospheric) radiation through a horizontal surface. (WMO - '71)

NET RADIATION

Difference between downward and upward (total and terrestrial) radiation; net flux of all radiation. (IMV - '66)

NET SOLAR RADIATION

Difference between the solar radiations directed downwards and upwards; net flux of solar radiation. (IMV - '66)

NET TERRESTRIAL RADIATION
TERRESTRIAL RADIATION
BALANCE

Difference between downward and upward terrestrial radiation; net flux of terrestrial radiation. (IMV - '66)

PERCENTAGE OF POSSIBLE SUNSHINE

1. Ratio of the actual duration of bright sunshine to the geographically or topographically possible duration.

2. Ratio of the actual duration of bright sunshine to the astronomically possible duration of sunshine. (IMV - '66)

PYRANOGRAPH

Instrument for recording the solar radiation falling from a solid angle 4π on a spherical surface.

PYRANOMETER-SOLARIMETER

A pyranometer is an instrument for the measurement of the solar radiation received from the whole hemisphere. It is suitable for the measurement of the global or sky radiation. (WMO - '71)

PYRGEOMETER

A pyrgeometer is an instrument for the measurement of net atmospheric radiation on a horizontal upward facing black surface at the ambient air temperature. (WMO - '71)

PYRHELIOMETER-ACTINOMETER

A pyrheliometer is an instrument for measuring the intensity of direct solar radiation at normal incidence; it can either be a primary standard instrument or a secondary instrument scaled by reference to a primary instrument. (WMO - '71)

PYRHELIOMETRIC SCALE

Scale of measurement of irradiance as determined by an absolute standard type pyrheliometer. (IMV - '66)

PYRRADIOMETER

A pyrradiometer is an instrument for the measurement of both solar and terrestrial radiation. (WMO - '71)

RADIANCE (RADIANT INTENSITY PER UNIT AREA)

(at a point of a surface in a given direction)
Quotient of the radiant intensity, in the given direction, of a infinitesimal element of the surface containing the point under consideration, by the area of the orthogonal projection of this element on a plane perpendicular to the given direction. (IMV - '66)

RADIANT EMITTANCE

(from a point of a surface)
Quotient of the flux of radiation emitted by an infinitesimal element of surface containing the point under question, by the area of that element. (IMV - '66)

RADIANT FLUX (FLUX OF RADIATION, RADIANT POWER)

Power emitted, transferred, or received in the form of radiation. (IMV - '66)

RADIANT INTENSITY

(of a source in a given direction)
Quotient of the radiant power emitted by source, or by an element of source in an infinitesimal cone containing the given direction, by the solid angle of that cone. (IMV - '66)

RADIATION

Emission or transfer of energy in the form of electromagnetic waves or particles. (IMV - '66)

RADIOMETER

Instrument for measuring radiation. (IMV - '66)

REFLECTED SOLAR RADIATION
REFLECTED GLOBAL RADIATION

Upward-directed solar radiation, reflected and scattered by the earth's surface and the atmosphere. (IMV - '66)

REFLECTOMETER

Downward-facing pyranometer (solarimeter), used for measuring reflected solar radiation. (IMV - '66)

SHORT-WAVE RADIATION

Radiation with wave lengths less than four microns. (IMV-'66)

SOLAR CONSTANT

Amount of solar radiation incident, per unit area and time, on a surface which is normal to the radiation and is situated at the outer limit of the atmosphere, the earth being at its mean distance from the sun. (IMV - '66)

SOLAR RADIATION

Radiation emitted by the sun. (IMV - '66)

SPECTRAL SOLAR RADIATION

Radiation of selective wave lengths of the solar radiation.

SPHERICAL PYRANOMETER

Instrument for measuring the solar radiation falling from a solid angle 4π on a spherical surface. (IMV - '66)

SPHERICAL PYRGEOMETER

Instrument for measuring the long-wave radiation falling from the solid angle 4π on a spherical surface. (IMV - '66)

SPHERICAL PYRRADIOMETER

Instrument for measuring total radiation falling from a solid angle 4π on a spherical surface. (IMV - '66)

TERRESTRIAL RADIATION

Radiation by the earth, including its atmosphere. (IMV - '66)

TOTAL RADIATION

Sum of solar radiation and terrestrial radiation. (IMV - '66)

TRANSMISSION COEFFICIENT

Measure (τ) of the intensity of the radiant flux which remains in a beam after traversing unit thickness of a medium. For luminous flux it is related to the extinction coefficient (σ) by the relation: (IMV - '66)

$$\tau = e^{-\sigma}$$

TURBIDITY

In meteorology, a condition of the atmosphere which reduces its transparency to radiation, especially to visible radiation.

ULTRA-VIOLET RADIATION

Radiation with wave lengths less than 0.4 micron and higher than 0.03 micron. (IMV - '66)

UPWARD (TOTAL) RADIATION

Solar and terrestrial radiation directed upwards (towards space). (IMV - '66)